BULLETIN OF THE INSTITUTE OF THE HISTORY OF MEDICINE

THE JOHNS HOPKINS UNIVERSITY

Editor—HENRY E. SIGERIST

VOLUME V JUNE, 1937 NUMBER 6

JOHN HOWARD AND THE PUBLIC HEALTH MOVEMENT*

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I. INTRODUCTION

I should perhaps apologize in bringing to the attention of this gathering a man who was neither scientist nor historian. However, inasmuch as I hope to show that, though a layman without particular professional training and holding no important public office, John Howard left such an indelible impression on his times and upon certain phases of social development, that he well merits the thoughtful consideration of such a group as this. We shall see that in eradicating typhus from English prisons he was responsible for a medical achievement of no mean character and that his demonstration of the pitiful conditions then prevalent in gaols, hospitals, orphanages and various houses of correction, led not only to the immediate reform of these evils by legislative action, but to a wider social awakening which ultimately grew into those organized medical, sanitary and social activities which we now refer to as the public health movement.

Born in 1726 at a time when the world was reaping certain practical rewards of the scientific renaissance of the 17th century,

*Read before the joint session of the American Historical Association and the History of Science Society, Providence, R. I., Dec. 30, 1936.

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Howard was subjected to little of the formal education or scientific training that the era afforded; he, none the less, was saturated with much of its tradition. Conservatism had lived on into the century, especially in academic halls, where lectures in an erudite Latin still were given, and the newer knowledge derived from practical experience and scientific experimentation still lay outside the walls of university and church. And in accord with these new trends Howard, like Robert Boyle and Thomas Sydenham of the previous century, did his work far from academic and laboratory halls.

Another spirit and influence had developed by the time Howard was to receive the few years of schooling he had, and to form those strong traits of character which have stigmatized him for most of his biographers. By 1726, the date of his birth, Christian piety was full blown and had superseded the old theology even as Roman law had given way to natural law. Rousseau was preaching of nature, and the world was presently to become so concerned with the new doctrine of the rights of man that a new liberalism and a French revolution were inevitable. Humanitarianism is a word not found in Johnson's dictionary and its development in the 18th century was a potent factor in the history of that age. The day of the enlightened despots and reform had come. Taine (15) aptly describes the English of this period:

> They have succeeded; Bakewell transforms and reforms their cattle; Arthur Young their agriculture; Howard their prisons; Arkwright and Watt their industry; Adam Smith their political economy; Bentham their penal law; Locke, Hutcheson, Ferguson, Joseph Butler, Reid, Stewart, Price, their psychology and their morality. They have purified their private manners, they now purify their public manners. They have settled their government, they have confirmed themselves in their religion. Johnson is able to say with truth, that no nation in this world better tills its soil and its mind. There is none so rich, so free, so well-nourished, where public and private efforts are directed with such assiduity, energy, and ability towards the improvement of public and private condition. One point alone is wanting; lofty speculation. (Vol. 2, p. 48.)

II. Life of John Howard

These were the traditions which were alive when John Howard was born about 1726—or 1727—in either Enfield or Clapton, near London. His father was an upholsterer and carpet warehouseman

who had accumulated a considerable fortune. Little is known of the family or of John Howard's early life. The father, a strict Protestant dissenter, entrusted his only son at an early age to a minister of the same faith, named Worsley, who kept a small school in Hartford. For seven years young Howard had instruction here of one sort or another, though Dr. Aiken (2), perhaps the most reliable of

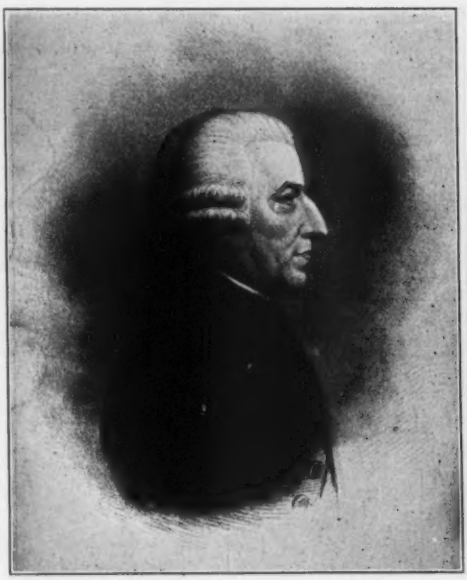

Fig. 1. John Howard. Taken from a portrait in Brown's *Memoirs* (see reference no. 6).

Howard's contemporary biographers, assures us that " he left it not fully taught in any one thing." A short period in Mr. Eames' academy in London, an institution of somewhat better standing, and Howard's formal education was completed.

Despite the fortune he was to inherit he was apprenticed to a wholesale grocer in the city; but upon finally receiving that inheritance he promptly bought out the remainder of his time in the apprenticeship and set out for his first European travels. Probably

ill-health forced him to return, for we find him settled soon afterwards in Stoke Newington taking a prescribed 'consumptive' cure. He was about twenty-five, except for a sister, alone in the world, he had some education, had traveled and was in complete command of a substantial fortune. Small wonder that much comment has been made on his next move; a proposal of marriage to the more than 50-year old landlady who had cared for him in his illness. The lady protested but Howard insisted upon the marriage. Within three years he was a widower and again he turned to the continent—this time to see Portugal and what was left of Lisbon after the great earthquake of 1755. But the Hanover on which he set sail was captured by a French privateer and Howard had his first experience in a prison, an accident of no small significance, since it unquestionably heightened his later interest in prison reform, which was to give impetus to the entire humanitarian movement. In the introduction to his monumental book on prisons (10), he describes this experience and it seems well worth while to listen to his own words.

> Before we reached Brest, I suffered the extremity of thirst, not having for above forty hours one drop of water; nor hardly a morsel of food. In the castle at Brest, I lay six nights upon straw: and observed how cruelly my countrymen were used there and at Morlaix, whither I was carried next; during two months I was at Carhaix upon parole, I corresponded with the English prisoners at Brest, Morlaix, and Dinnan: at the last of these towns were several of the ship's crew, and my servant. I had sufficient evidence of their being treated with such barbarity that many hundreds had perished, and that thirty-six were buried in a hole in Dinnan in one day." (p. 22-23.)

Upon his return to England he settled down at his estate in Cardington, enlarging and improving the house and gardens and in two years marrying a Miss Henrietta Leeds, who seems to have been a lady of charm and intelligence. Her tastes were so similar to those of her husband that with her Howard spent what he often referred to as the only happy years he ever knew. Together they cared for their tenants, building model cottages, overseeing their education and religious instructions; finding recreation from these pursuits chiefly in planting an extensive garden and orchard about their Cardington house. She was a member of the Church of England and he a Dis-

senter, but both found joy in the expression and practice of their religious sentiments. The happy days were climaxed after seven years in the birth of a son, but eclipsed as well, for the mother died a few days later. Howard stayed quietly on in Cardington, continuing the visits to the poor, and the improvement of his estate which he had begun with his devoted wife. After two years he was again off for an extended tour of the continent. Excerpts from letters written in the two years he traveled give evidence of his personality.

Fig. 2. The house at Cardington.

Rome, June 13th, 177-- . . . I had often read of the Laocoon, the Apollo, the Gladiators, the Pantheon and Coliseum, the paintings of Raphael, Titian and Guido, yet the description fell far short,—as it does also of the magnificence and elegance of St. Peter's. To that church and the Vatican I go most evenings, the views from the latter being inexpressively fine. The Pope I have often seen. The worthy good man dispenses with my kneeling. I should tremble to pay that homage to any human creature that I have seen paid to him. The Pretender passed close by me yesterday, and I had a full strong view of him. He had the look of a mere sot—very stupid, dull, and bending double; quite altered to when I saw him twenty years ago in France.

The situation of Naples is fine. As I have the best *cartes*, it may afford your ladyship some pleasure to see them. I ascended Mount Vesuvius; and when I was up three parts of the hill, the earth was, by my thermometer, somewhat warmer than the atmosphere. I then took the temperature every five minutes till I got to the top. The heat was continually increasing. After

I had stood the smoke a quarter of an hour I breathed freely; so with three men I descended as far as they would go with me, where the earth or brimstone was so heated, that, in frequent experiments, it raised my thermometer to 240°, which is 30° hotter than boiling water, and in some places it fired some paper I put in. As these experiments have never before been made, I thought the account of them might afford your ladyship some entertainment.[1]

Abbeville, January 4th, 1770 . . . After I landed in France, my first object was Geneva, where I spent some time before I went into Italy. The luxury and wickedness of the inhabitants would ever give a thinking mind pain, amidst the richest country, abounding with the noblest productions of human power and skill. I was seven days recrossing the Alps. The weather was very cold; the thermometer 11° below the freezing point. The quick descent by sledges on the snow, and other particulars, may perhaps afford a little entertainment some winter's evening. I returned to Geneva. There are some exemplary persons; yet the principle of one of the vilest men (Voltaire) with the corruption of the French, who are within one mile of the city have greatly debased its ancient purity and splendor. I spent about ten days at the dirty city of Paris. The streets are so narrow, and no footpaths, that there is no stirring except in a coach; and as to their hackney carriages, they are abominable. There are but few English in Paris. I dined with about twenty at our ambassador's ———. I am now on my route to Holland a favorite country of mine. Above all, I esteem it for religious liberty. . . . My knowledge of human nature should be enlarged by seeing more of the tempers, and dispositions of different people . . ." (taken from pp. 22-25 Gibson, 8).

Thus we find Howard at 46 years of age—a middle-class landowner who had certainly done nothing remarkable. From now on his life was to change. He was appointed high sheriff of Bedford county in 1773. It was an office which could be taken lightly, but neither Howard's character nor personality allowed him to do this. And perhaps, remembering his experience in a French prison eighteen years before, he attended the first assizes with more than usual interest. Here he discovered one of the many evils then common in prison management—the practice of putting acquitted prisoners back into jail because they had not paid all the customary fees due to the jailer for the privilege of being taken into custody! So concerned was Howard that he felt something must be done to abolish these fees and he promptly set out on a tour of neighboring prisons to see what was done there. He did not find the precedent

[1] These experiments were subsequently described in one of Howard's written contributions to the Royal Society. See reference 9.

he sought but instead, his life work. Until he died seventeen years later he investigated public institutions, making in all seven tours abroad and three long ones in the British Isles. Never spending more than a few weeks at a time at home or away from his investigations, he covered 42,033 miles in his first ten years and was still to make two extensive foreign tours and a final English one. The bulk of his fortune was spent in the cost of travel, publication of his experiences, and his constant benevolences to the unfortunate people he saw. He went through such filth that his clothes became too offensive for him to remain in a carriage, so he continued his journeys on horseback. "The leaves of my memorandum book," he wrote, "were often so tainted that I could not use it until after spreading it an hour or two before the fire; and, even my antidote, a vial of vinegar, has after using it in a few prisons, become intolerably disagreeable." His tours took him as far as Constantinople, Smyrna and Russia; introduced him to the most important, as well as the most unfortunate personages in every land he visited, and earned for him in his lifetime unusual honor and praise, both in his own country and abroad.

Howard's general popularity is perhaps as well illustrated by the following quotation as any we could choose. It is from the pen of Mrs. Elizabeth Inchbald, a popular dramatist of the period who wrote a play entitled *Such Things Are* in which one of the leading roles is based on Howard's life and work. As she says in the introduction to the 1787 edition of the play: (London G. G. and J. Robinson, 1787, [8], 66, [3] pp).

> The travels of an Englishman throughout Europe, and even in some parts of Asia to soften the sorrows of the prisoner, excited in the mind of the author the subject of the following pages, which formed into a dramatic story, have produced from the Theatre a profit far exceeding the usual pecuniary advantages arising from a successful comedy.

Howard died in 1790, possibly of typhus, in Russia. Not only did Russian princes walk behind his bier, but the orthodox church, St. Paul's in London, did him the unusual honor of placing a large statue of a Dissenter in its nave.[2]

[2] The amusing story of the erection of this monument is easily followed in the contemporary issues of the *Gentleman's Magazine* and is retold by Abraham. (1)

Fig. 3. Statue in St. Paul's Church, London, executed by Bacon and erected after Howard's death.

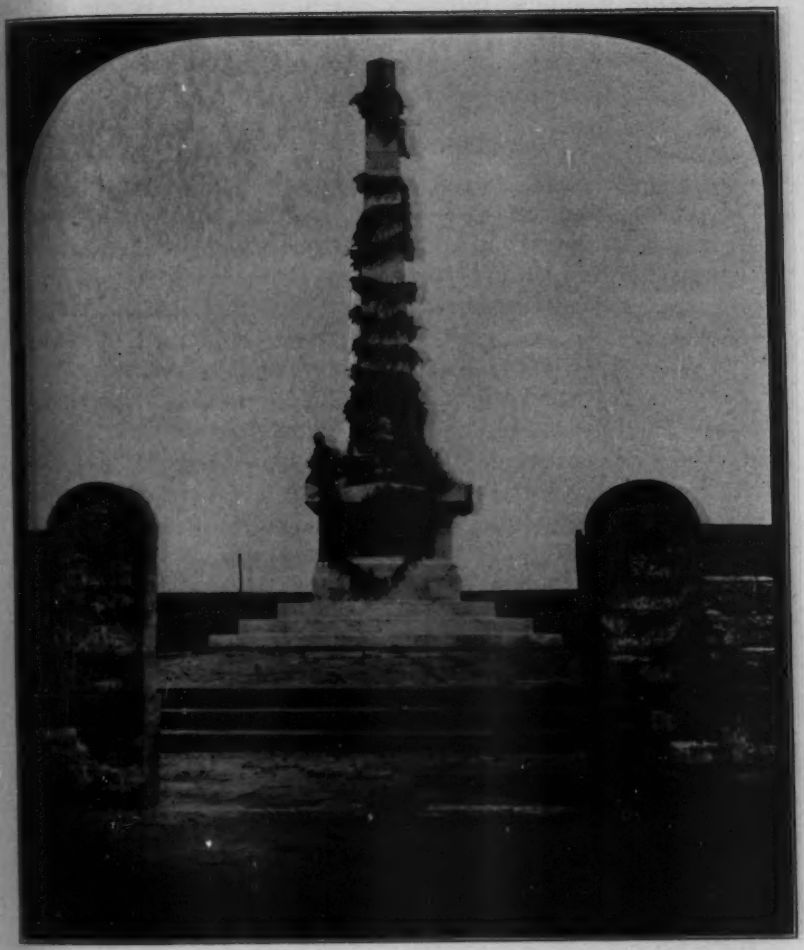

Fig. 4. Monument in Cherson, Russia, where Howard died.
(Courtesy of Prof. Lina S. Stern, State Institute
of Physiology, Moskow.)

As far away as America, Benjamin Rush and eighteen other prominent colonists subscribed for more than two copies each of his biography [3] and as late as 1829 we find on the roster of the Howard society in Boston, names as illustrious as Lowell, Eliot, Tappan, and Warren.[4]

III. John Howard's Work

Turning from this brief sketch of John Howard's life, let us see what his contributions to science and to history were. They can readily be considered under four heads: 1) his actual scientific writings; 2) his part in prison reform; 3) the eradication of gaol fever and ideas on plague; and 4) his influence on the public health movement.

The first is easily dispensed with—three publications in the *Philosophical Transactions of the Royal Society, London*, all on meteorological observations he had made. He had been elected a Fellow of the Royal Society eight years before his first publication. To this list of scientific writings should certainly be added the investigations into the cause, epidemiology and prevention of gaol fever and plague, which will subsequently be described. His painstaking descriptions and recommendations for prisons and hospitals con-

In May of 1786 Rev. John Warren, D. D. suggested in the columns of the *Gentleman's Magazine* that a monument to Howard be erected. Dr. Lettsom promptly sent in ten guineas and with other prominent individuals sponsored the project, so that by November of the same year over £1500 had been subscribed. Howard, who had been abroad, finally heard of the idea and was most distressed. "I can hardly lift up my head," he wrote. "Could not my friends have prevented this sad event." The sponsors at home were thus embarrassed and attempted to dispose of the funds they had collected in the form of relief funds for prisoners, but again Howard objected. In despair, they finally advertised that subscribers could get their money back. Out of 608, 125 withdrew their contributions, but £1300 was left. The Committee laconically and apparently at infrequent meetings attempted to do something with the money, until by January of 1790 Howard conveniently died and they proceeded to erect the statue for which the money was originally collected. John Bacon, the sculptor, wished to depict the philanthropist as leaning over a prisoner; however, the figure of Dr. Johnson, which Bacon had previously fashioned for St. Paul's, was a single figure. Bacon was only allowed to put Howard on a bas relief on the pedestal.

[3] From a subscription list appearing in the copy of reference No. 3 found in the Huntington library.

[4] See appendix to reference 6.

stitute an excellent sanitary report—as Sweeting's (15) compilations from Howard's writings so clearly emphasize.

Howard's contribution to the prison reform movement has been so widely described that this is almost the only connection in which his name is mentioned. It is of some interest to recall that his first tour in the autumn and winter of 1773 led to an immediate result; for in March of 1774 he was called before the House of Commons to express his opinions concerning a bill to reform the gaoler's fees. The bill had been introduced in 1773 by a Mr. Popham of Taunton, but dropped. After Howard's presentation, not only Popham's bill, but a second one concerning the health of prisoners was passed. Howard was not content, but issued handbills publicizing the new laws and for years continued his inspection tours to see how effectively the reforms corrected the evils inside prison walls. By 1777 he was ready to print his first book (10), entitled *The State of Prisons in England and Wales, with preliminary observations, and an account of some foreign prisons*, the volume for which he is chiefly remembered. It was first issued as a quarto of about 500 pages, profusely illustrated with the plans and pictures of the gaols, instruments of torture, et cetera, which he had collected in his travels. He had no desire to make any money from the sale of the book; as Aiken (2) says, " besides a profuse munificence in presenting copies to all the principal persons in the kingdom and all his particular friends, he insisted on fixing the price of the volume so low, that, had every copy been sold, he would still have presented the public with all the plates, and a great part of the writing. And this practice he followed in all his subsequent publications; . . ." (p. 42). Aiken, who was with Howard in the days he was compiling his volume, continues, ' He chose the press of Mr. Eyres at Warrington, induced by various elegant specimens which had issued from it, and by the opportunity a county press afforded, of having the work done under his own inspection, at his own time, and with all the minute accuracy of correction he determined to bestow upon it " (p. 42). Warrington was the home of the fruitful group of dissenters, who as Dr. Fulton (7) has recently pointed out, were responsible for many important contributions to English medicine and science in the 18th century. The Warrington Academy, precursor

to the non-conformist Manchester College, Oxford, had been founded in 1757 and was still active when Howard arrived there. Joseph Priestley, the chemist and probably the most distinguished member of its faculty had left in 1767, but John Aiken, the scholarly practitioner of medicine and writer, was, as we have already mentioned, still there. The printer, William Eyres, had flourished for ten years and had already published some of Priestley's works, Forster's *Travels* (1770) and other volumes, celebrated not only for their contents, but for their typographical excellence. In such an atmosphere Howard produced his memorable work. Aiken (2) has given us this picture of how the book was written.

> . . . On his return from his tours he took all his memorandum books to an old retired friend of his, who assisted him in methodizing them, and copied out the whole matter in correct language. They were then put into the hands of Dr. Price, from whom they underwent a revision, and received considerable alterations. . . . With his papers thus corrected, Mr. Howard came to the press at Warrington; and first he read them all over carefully to me, which perusal was repeated, sheet by sheet, as they were printed. As new facts and observations were continually suggesting themselves to his mind, he put the matter of them upon paper as they occurred, and then requested me to clothe them in such expressions as I thought proper. On these occasions, such was his diffidence, that I found it difficult to make him acquiesce in his own language when, as frequently happened, it was unexceptionable. (p. 45.)

And Brown (5), another almost contemporary biographer, adds these notes:

> For the purpose of being near the scene of his labours, he took lodgings in a house close to his printer's shop; and so indefatigable was he in his attention to the business—that during a very severe winter he was always called up by two in the morning though he did not retire to rest until ten. He found the morning the stillest part of the day, and that in which he was the least disturbed in his work of revising the sheets as they came from the press. At seven, he regularly dressed for the day, and had his breakfast; when punctually at eight he repaired to the printing office, and remained there until the workmen went to dinner at one, when he returned to his lodgings, and putting some bread and raisins, or other dried fruit, in his pocket, generally took a walk in the outskirts of the town, during the time of their absence, eating as he walked along his hermit fare, which, with a glass of water on his return, was the only dinner he took. Sometimes he would call in upon a friend in his way, though the acquaintance he formed in this town was not

NEWGATE.

NEWGATE.

GAOLER, *Richard Akerman.*

Salary, £200.

Fees, Debtors, - £0 : 8 : 10.
Felons, - 0 : 18 : 10.
Miſdemeanors or Fines, 0 : 14 : 10.
Tranſports, - 0 : 14 : 10.

Licence, Beer and Wine.

PRISONERS,

Allowance, Debtors, } a penny loaf a day, (*weight Dec.* 1782, 8½ oz. *Aug.* 1783, 9½ oz.) *now*, felons on the common ſide a three halfpenny loaf. *(See Remarks.)*
Felons, }

Garniſh, Debtors, £0 : 5 : 6.
Felons &c. 0 : 2 : 6.

Number,	Debtors.	Felons &c.		Debtors.	Felons &c.
1775, March 5,	33,	190.	1779, Aug. 16,	51;	141.
1776, ----- 1,	38,	129.	1782, Dec. 18,	3,	291.
----- May 17,	46,	212.	1783, Aug. 22,	113,	224.
----- Dec. 26,	33,	152.			

CHAPLAIN, Rev. Mr. *Villette.*

Duty, Sunday twice; every day prayers with the condemned; once a month ſacrament.

Salary, was £35, &c. now augmented. *(See Remarks.)*

SURGEON, Mr. *Olney.*

Salary, £50, now £100, for all priſoners.

REMARKS. THE builders of Old Newgate ſeem to have regarded in their plan, nothing but the ſingle article of keeping priſoners in ſafe cuſtody. The rooms and cells were ſo cloſe, as to be almoſt the conſtant ſeats of diſeaſe, and ſources of infection; to the deſtruction of multitudes, not only in the priſon, but abroad. The city had therefore very good reaſon for their reſolution to build a new gaol. The plate will give a better idea of it than any deſcription. I give the plan, rather to ſatisfy the curioſity of my readers, than as a model to be followed. Many inconveniences of the old gaol are avoided in this new one: but it has ſome maniſeſt errors. It is now too late to point out particulars. All I will ſay, is, that without more than ordinary care, the priſoners in it will be in great danger of the gaol-fever.

The

Fig. 5. A page from the third edition of *The State of Prisons*, illustrating the meticulous detail in which Howard recorded each visit to an institution.

very numerous, consisting principally of a few friends of the Society of Friends, to whose habits and manners he was at all times attached, and some of the literary men of Unitarian sentiments, whom the academy for training young men to the ministry in that denomination had attracted hither. When he returned to the printing office he generally remained there until after the men left for work, and then, repaired to Mr. Aiken's house, to go through with him any sheets which might have been composed during the day; or, if there were nothing upon which he wished to consult him would spend hours with some other friends, or return to his lodgings, where he took his tea or coffee, in lieu of supper; and at his usual hour retired to bed. (pp. 208-209.)

The quarto was divided into five sections. The first two are most readable accounts of the purposes of the volume and a general view of the distressing conditions he had found, including the social, medical, sanitary and economic practices he thought most objectionable. In a third section he offers suggestions for improving the structure and management of prisons. And in the final sections, composing the bulk of the volume, he describes the institutions he had seen abroad and at home. Here are descriptions, the exactness, detail, and objectivity of which are models of the scientific method. The subsequent editions of the *State of the Prisons* and the book on *Lazarettos* (12) were as carefully edited. Each new edition of the book on Prisons (three during Howard's life) was almost entirely rewritten with details of each subsequent visit to the institution recorded. No detail from the name of the gaoler to the ounces in the loaves of bread served was too small to be noted. Figure 5 reproduces a page from the third edition and illustrates the meticulousness with which Howard recorded all he saw.

The use of this method of exact of objective description cannot fail to give Howard a place among those to which credit for the scientific renaissance of the 18th century is given. He seems aware of its value, for in the introduction to his book on *Lazarettos* he says:

One consequence of my inquiries has been a conviction of the importance . . . of properly constituted lazarettos. . . . The circumstances from which I drew this conclusion will be found in their proper places in the narrative; for I shall in this publication, as I did in my former ones, confine myself chiefly to the narration of facts. What attention these facts deserve, and what measures it may be advisable to adopt in consequence of them, I leave to the determination of the proper judges. (p. 2.)

Again the quality of his thinking can be judged by this statement with which he concludes a discussion of certain opinionated ideas of contagious fevers:

> Such are the effects of a preconceived hypothesis in perplexing or obscuring the *plainest* matter of fact! (p. 43.)

The study of lazarettos was undertaken in order to study these institutions in the light of what they might offer in the prevention of disease. As Howard says,

> In my latest tours, I had with pain observed, that notwithstanding the regulations which had been made in our own country, and elsewhere, for preserving health in prisons and hospitals, yet the infectious diseases continued occasionally to arise and spread in them. I had also been led, by the view of several lazarettos in my travels, to consider how much all trading nations are exposed to that dreadful scourge of mankind which those structures are intended to prevent, and to reflect how very rude and imperfect our own police was with respect to this object. It likewise struck me, that establishments, effectual for the prevention of the most infectious of all diseases, must afford many useful hints for guarding against the propagation of contagious distempers in general. (p. 1.)

From his observations he formulated a scheme on " proposed regulations and a new plan for a lazaretto," including rules on quarantine and several suggestions of particular problems to be met in the English situation.

The visits to lazarettos involved more than a recording of the number of inmates or floor plans—for Howard arranged to get himself on a ship with an unclean bill of health so that he personally experienced the routine of quarantine in various ports. He was interested in everything that pertained to health and his descriptions furnish many vivid pictures of 18th century public health practices. An excellent example is his description of the health office in Venice.

> This important office is governed by three commissioners, annually chosen by the senate, whose duty it is to attend every day to the business of the office; and to them are added two assistant commissioners, and two extraordinary, who have formerly served as junior commissioners, or are gentlemen of wisdom and experience: . . . The power or authority of this court is very extensive; for, when all the seven magistrates sit together, their judgments are decisive and without appeal, as well in civil as criminal affairs that relate to public health, all which fall under their cognizance; by which

means this court is one of the most respectable in the government, and accordingly is always filled by persons of approved integrity and reputation, and in easy circumstances, in order to be less exposed to corruption, as their emoluments are very small, although it is a step towards more lucrative employments. . . .

. . . It maintains overseers in different parts of the city to inspect the provisions sold in the public markets, shops or otherwise, who make their report of whatever they find that might have a tendency to affect the public health; their business is also to superintend beggers, to prevent loathsome and noxious distempers being derived from want and misery, or other obvious causes; they keep an exact register of deaths, and the bodies of those who die without any previous malady, are accurately examined by the physicians and surgeon immediately belonging to the office; both these have a fixed salary, and are consulted by the board in cases relating to their respective professions; they are also obliged in contagious emergencies to shut themselves up in the lazaretto to take care of the sick. . . . Besides the health-office at Venice, every city or town of any note or commerce has one of its own, upon the same plan as that of the metropolis, directed by gentlemen of the place not concerned in trade, who serve *gratis*, and think it an honour to watch over the health of their fellow citizens; the necessary ministers and clerks are paid by their respective communities; and all these courts of health are dependent on that of Venice, and accountable to it in every respect. (pp. 12-13.)

The third contribution with which I should like to associate Howard's name is in the eradication of gaol fever or typhus, a scourge in the English prison system long before the famous Black Assizes of Oxford in 1557. Howard not only questioned gaolers, doctors, and officials he saw in order to collect data, but himself looked at prisoners.

In one of the dark dungeons down twenty-four steps, I thought I found a person with the goal fever. He was not capable of speaking to me; but on examining his breast and feet for *petechiaë* or spots, and finding he had a strong intermitting pulse, I was convinced that he was not ill of that disorder. (11-p. 103.)

He listed and described thirty-three individual instances of epidemic gaol typhus in as many institutions. He tabulated morbidity and mortality statistics and investigated all the sanitary arrangements, attempting to relate the latter to he spread of the disease. It was not known at the time that lice carried typhus, so Howard can perhaps be pardoned that the bill he sponsored in 1774 ("*An Act for the preserving of the Health of Prisoners in Gaol, and prevent-*

ing the Gaol Distemper") did not include any recommendations for the disposal of wearing apparel of infected persons. Cells were ordered scraped and whitewashed once a year, ventilation and isolation of the sick provided and prisoners were to be washed before discharge. It is not without significance, however, that in his later travels in England, Howard was to find almost no gaol fever. This state of affairs was not to last, for even in those days acts of Parliament did not eradicate the evils of institutional procedures and fifty years later Nield was to find conditions resembling those in Howard's time, but Howard had carried through a program which led to such a marked decrease in the morbidity rate of typhus that any physician will envy him.

Howard was conversant with the best writings of the day, possibly through his friendship with Aiken. At least he quotes a personal letter from James Lind, who not only carried out the anti-scurvy campaign so effectively on his Majesty's ships but was responsible for a critical essay of fevers, one of the best of that century. The names of Haygarth, Fothergill, Sir John Pringle, Richard Mead, Lettsom, Stephen Hales, the most eminent names in English medicine appear in Howard's writings and often his name is found in theirs. Of foreign scientists he knew Tissot, the celebrated clinician, Haller, the versatile genius of Bern, and Maximilian Stoll, the great physician of Vienna.

To the understanding of another specific disease, bubonic plague, Howard attempted to make a contribution. Before his 1785 European tour, undertaken largely to study the chief lazarettos abroad, he secured from his friends, Dr. Aiken and a certain Dr. Jedd, specific questions concerning plague, which he might put to the most experienced practitioners he met. With Dr. Aiken's assistance the answer from physicians and surgeons of Marseilles, Leghorn, Malta, Venice, Trieste, and Smyrna were tabulated and form a most interesting nine-page report.[5] The conclusion Howard allows himself to make is:

[5] These and Howard's other ideas and observations on contagious diseases have been considered by John E. Ransom (14) in a paper which has just appeared in this Bulletin. Further discussion of them therefore has been eliminated from this report.

> Though there are various points in which the answerers of the preceding questions disagree, yet it is with pleasure I observe that they all in the most explicit manner concur in representing the plague as a *contagious* disease, communicated by near approach to, or actual contacts with, infected persons or things. This is a fact of the greatest importance to be established, as all the proposed means of prevention by cutting off communication with the sources of infection must depend upon it. (Reference 12, p. 42.)

He then bemoans that as famous a clinician as Stoll of Vienna says the plague is not contagious but notes that it is:

> very strange and suspicious that he should go back to Livy's Roman History for proofs to establish this point, totally neglecting all the facts concerning the numerous visitations of the plague recorded in modern medical books, or which happened in his own time. (p. 42.)

The careful reporting of those things "which happened in his own time" is Howard's chief contribution. This can, perhaps, be best appreciated if we turn for a moment to another 18th century figure, often mentioned in the history of the public health movement. Johann Peter Frank, physician and professor, who taught in academic institutions of Germany, Italy, Austria, and Russia, enjoyed great acclaim in his life time, but this work was soon more or less forgotten. He produced a six-volume system of public health (4), one of the first comprehensive works on the subject. It was full of quotations, suggestions, and plans, and covered every aspect of contemporary life that might relate to personal or communal health. Like Howard's Books it was written in the vernacular; but instead of letting a few well-founded facts speak for themselves, Frank had elaborate proposals for all public and personal health problems. He believed it was only necessary to persuade the ruling monarch to pass laws that furthered the welfare of his people and fix the penalty for the transgressor; anything could be accomplished by a benevolent despot who had proper officials to carry out the laws Frank suggested. Howard, on the other hand, saw, described, and interested a large number of his countrymen in the sufferings of a small group of people in prisons and hospitals. After a law was passed he spent fifteen years reporting on how well it was being enforced. He never mentioned the marvels of the Roman water supplies or wrote out the details of an ideal sanitary code, but after

his reports on the cubic feet of floor space available in one hundred thirty-eight institutions he personally had visited, the public demanded a different standard of living. Not only was the English public sufficiently interested in recognizing Howard to raise £2,000 by voluntary contribution for his statue—but such medical figures as Lettsom, Currie, and Fothergill, all praised his work. Burke spoke for them all when he wrote ten years before Howard's death:

> I cannot name this gentleman without remarking that his labours and writing have done much to open the eyes and hearts of all mankind. He has visited all Europe—not to survey the sumptuousness of palaces, or the stateliness of temples; not to make accurate measurements of the remains of ancient grandeur, not to form a scale of the curiosity of modern art; not to collect medals or collate manuscripts—but to dive into the depths of dungeons and plunge into the infections of hospitals; to survey the mansions of sorrow and pain; to take the gauge and measure of misery, depression, and contempt; to remember the forgotten, to attend the neglected, to visit the forsaken, and compare and collate the miseries of all men in all countries. His plan is original and it is full of genius as it is of humanity. It was a voyage of discovery, a circumnavigation of charity. Already the benefit of his labour is felt, more or less, in every country. (Frequently reprinted—see p. 29 of reference 13.)

So Howard should be remembered not only as a prison reformer, but as an important link in the development of the public health movement. For public health as we know it is a social activity, not a circumscribed intellectual discipline. It found its birth and its traditions in the new humanitarianism of the 18th century to which Howard so ably contributed—and the materials for its subsequent development in the newer knowledge of bacteriology, engineering, preventive medicine, and social economics. Others had had similar philanthropic instincts but Howard's meticulously recorded observations focused the public mind on a concrete problem and gave impetus to a social consciousness which has probably not yet seen its full fruition.

REFERENCES

A bio-bibliography of John Howard has been prepared, and was to have appeared as an appendix to this paper. Due to its length it has been deemed wiser to present it separately. The following list is only to references specifically quoted in the text, and does not include other source material on

which this paper has been based. The reader is referred to the bio-bibliography of Howard shortly to appear in this *Bulletin*.

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SOCIAL ASPECTS OF JACOB HENLE'S MEDICAL THOUGHT

GEORGE ROSEN, M. D.

Geschichte ist das Geschehene und was fort und fort geschieht in der Zeit.

THOMAS MANN.[1]

Geschichte vereinigt in unserer Sprache die objective sowohl als subjektive Seite und bedeutet ebensogut die historiam rerum gestarum als die res gestas selbst; sie ist das Geschehene nicht minder wie die Geschichtserzählung.

G. W. F. HEGEL.[2]

I.

Medicine evolved out of a social need. Hippocrates in his "Ancient Medicine" describes as follows the origins of medicine: "For the art of medicine would never have been discovered to begin with, nor would any medical research have been conducted—for there would have been no need for medicine—if sick men had profited by the same mode of living and regimen as the food, drink and mode of living of men in health, and if there had been no other things for the sick better than these. But the fact is that sheer necessity has caused men to seek and to find medicine, because sick men did not, and do not, profit by the same regimen as do men in health." [3]

Thus from the earliest times we find a recognition of the essentially social nature of medicine. However, as a science medicine can be considered from a social aspect not only in view of its function in society, but also with regard to its development in time. A moment's consideration will show us why.

Ever since man began to think about about disease, he has also attempted to comprehend the multiplicity of phenomena, which he observed by means of some fundamental underlying principle. Hip-

[1] Mann, Thomas. This quotation is taken from Alfred Neumann's Kaiserreich, Amsterdam, 1936.

[2] Hegel, G. W. F., Philosophie der Geschichte, Leipzig, 1923, p. 103.

[3] Hippocrates, Ancient Medicine. Trans. by W. H. S. Jones, Loeb Classical Library, v. I, New York, 1923, p. 17.

pocrates tells us that in his day " medicine has long had all its means to hand and has discovered both a principle and a method, through which the discoveries made during a long period are many and excellent . . ." [4] Man's teleologic will or his logical reason demand and will always demand such an explanation. The form and content of the medical theories, ideas and discoveries which have been produced in consequence have been variegated and manifold. These ideas, the lives of the men who produced them, the conditions under which they come into being and their ramifications in the unfolding development of human affairs are the stuff of medical history.

The manner in which this material has been treated has to a large extent depended on the contemporary state of historiography. Until very recently medical historiography consisted in the compilation of biographies arranged chronologically and according to the various doctrines and ideas which have swayed medical thought and practice. Hardly any attempt was made to show the relation between ideas in medicine and their socio-historical background. Recently an increasing recognition of the essential organic unity and interdependence of all human endeavour, intellectual as well as material, in the modern conception of history has begun to make itself felt in the writing of medical history.

The history of medicine, viewed as a social science, has still to be written but it is clear that it must be based on the dialectic method of modern historiography. The essence of the dialectic method is its attempt to confront the totality of history in time.[5] Historical facts do not stand isolated in time or space. A realistic consideration of history shows us time movements in human affairs. Contradictions appear in human society; clashing interests, ideas and institutions struggle for supremacy. Thesis and antithesis meet with the resulting reconciliation expressing itself in a synthesis providing conditions for further development. Causality in society therefore is dialectical. Because of these conditions it leads from the broad background of social and economic conditions to specific occurrences

[4] *Ibid.*, p. 15.

[5] Beard, Charles, Discussion of Human Affairs, New York, 1936, pp. 111; 114-115; 116; 117; 123.

and from these through their ramifications in time back to their influence on society.

These general considerations indicate that the medical thought of any period will necessarily reflect the political, social and cultural currents pervading the society of which it is a product. No one can conceive of medical men as being scientific robots living and acting in a vacuum. The physician and medical scientist are subject to the same social forces as are the other members of the communities in which they live. Their social views and political affiliations are determined by their reaction to these influences.

In the same degree that every scientist is a product of a definite social milieu so every achievement in science is also a social product founded on the basis of what has been accomplished in the past. The determination of the magnitude of an accomplishment resolves itself into the problem of ascertaining the previous achievements, the degree of intellectual and material development of society, and the social forms into which the producer was born and from which he drew his psychological and physical sustenance.

It will therefore be necessary in the history of medicine and medical theories to determine to what degree its productions are filled with the actuality of life and furthermore to ascertain the factors responsible for the vitality, which has endowed the conceptual structure with future value. The great accomplishments of medical theory obtain their sustenance from the dialectic relationship existing between science and society, the recognition of which remains the salient point in the sociological treatment of the problems of medical history. The medicine of any time is rooted in the premises of a certain period and place, so that its true meaning can only be gathered through the proof of this historic connection.

An attempt to elucidate the social and political factors, which have formed the milieu for scientific achievement would undoubtedly be able to throw much light on those dynamic processes which are the expression of the dialectic relations existing between science and other activities of society. Investigation and clarification of these social mechanisms cannot but lead to a broader conception of the history of medicine.

II.

The general considerations discussed above may best be illustrated by a concrete example. For this purpose I have chosen to examine Jacob Henle's medical thought with particular emphasis on its social implications. Jacob Henle was one of the most significant scientists of the 19th century; a man, who deserves to rank high in the history of medicine not only for his anatomical and pathological discoveries but also because as a teacher his brilliant, scintillating mind stimulated his pupils to fruitful thought and research. Particularly his two essays—" Über medizinische Wissenschaft und Empirie " and " Über Miasmen und Kontagien "—are among the most memorable achievements of scientific medical thought in the first half of the 19th century. Medicine, in an age so replete with rich creative forces and elements of unrest, was subject to an infinite number of new impulses. Everything tended to raise anew the question of the true goal of science, and one finds hardly a representative scientist who did not occupy himself with this problem.

Jacob Henle was born on July 19, 1809, at Fürth near Nürnberg as the son of a Jewish merchant. In 1815 the father's business affairs made it necessary for the family to move to Mainz and later to Koblenz in the Rhineland.[6] In the latter city Henle met Johannes Müller, who was then professor at Bonn. This acquaintance, which later ripened into an intimate friendship, was to have a decisive influence on Henle's career.

His youth and formative years were spent in a period of stirring events and under influences which were to have an important bearing on the tendency of his later thought.[7] The history of the first three decades of the nineteenth century was determined by the basic fact of the great social and political revolution in France. The French Revolution began in 1789 and soon developed into a titanic struggle between the revolutionary French state and all the rest of Europe. The French radicals had to resort to revolutionary propaganda and conquest.[8] The sansculottes crossed the Rhine and their

[6] Merkel, Friedrich—Jacob Henle, Göttingen, 1886, p. 3.

[7] Cf. *ibid.*, p. 3.

[8] a) Riazanow, D., Karl Marx and Friedrich Engels, New York, 1927, pp. 18-19.
b) Kussmaul, Adolf, Erinnerungen eines alten Arztes, Stuttgart, 1931, pp. 91-95.

first conquests were in the Rhine province. Jacobin societies sprang into being; many Germans enrolled in the revolutionary armies. During all this time the Rhineland could not help but be influenced by the doctrines of the revolution and at the beginning of the nineteenth century, the younger generation was still under the influence of the militant traditions of the revolution.[9] Such an atmosphere could not but leave a lasting impression in Henle's mind, and probably contributed to his liberal attitude in politics and science later in life.[10]

While living in Mainz his family had renounced Judaism and adopted Christianity.[11] In spite of the fact that Henle was still very young at the time, one may raise the question as to whether his being a Jew had any bearing on his subsequent intellectual development. This idea may at first seem a bit far fetched, until we stop to consider the large part that Jewish intellectuals played in the history of German thought and literature during the nineteenth century. Such names as Marx, Börne and Heine come immediately to mind.

With the overthrow of Napoleon in 1815 a period of brutal reaction was inaugurated in Germany. The Jews, who, particularly in the Rhine province, had received full civil equality under French rule, were forced again to live under restrictive laws similar to those under which they had suffered in medieval times.[12] Ludwig Börne grew up in the Frankfurt Judengasse under such conditions. Demagogues and agitators attacked the Jews and onerous persecutions fell on them. The desire to avoid these troubles and to give his children a more favorable future may have influenced Henle's father and prompted him to accept the prerequisite "Entreebillett zur europäischen Kultur"-baptism.[13]

These conditions also inclined the Jews toward political liberalism.[14] Jewish intellectuals felt the yoke of the police régime weigh-

c) The lives of Heinrich Heine and Georg Büchner exhibit these influences and are representative in this respect.

[9] Cf. Merkel, p. 3.

[10] *Ibid.*, p. 4.

[11] Elbogen, Ismar, Geschichte der Juden in Deutschland, Berlin, 1935, pp. 202-216.

[12] Cf. *ibid.*, p. 226.

[13] Wiener, Max, Jüdische Religion im Zeitalter der Emanzipation, Berlin, 1933, p. 260. Here the author is quoting Heine.

[14] Cf. *ibid.*, p. 271.

ing upon them even more keenly than their non-Jewish colleagues; in order to realise fully what censorship meant one should read the writings of Heine and Börne. In the belief that achievement of civil liberties would mean equality and social recognition many joined politically progressive groups.[15] (In this connection it is interesting to recall the fact that Dr. Abraham Jacobi, who was later to influence American pediatrics so profoundly, was one of the accused at the trial of the Communist League at Köln after the defeat of the revolution of 1848.[16]) There is no available evidence to show that this situation was directly influential in determining the direction of Henle's intellectual development. However, in view of the fact that so many of Henle's contemporaries reacted strongly to these conditions, one may assume with a certain degree of probability that these elements of the contemporary social scene were not without influence in imparting a liberal trend to Henle's mind.

Henle began his university studies at Heidelberg but in the fall of 1827 he went to Bonn. He had no definite interest in any particular field of endeavour; at one time he inclined towards theology, but he finally decided for want of something better to study medicine.[17] At Bonn Henle came under the influence of two movements which were to determine profoundly and decisively the direction and tendency of his future thought. The more important of these was the advent of a more realistic conception of the biologic sciences based upon experiment and observation. The guiding spirit of the new biology in Germany at the beginning of the third decade of the nineteenth century was embodied and concentrated in the person of Johannes Müller.[18] Henle had known Müller in Koblenz and in Bonn he again resumed friendly relations with his old acquaintance.[19] Under the latter's influence his interest in the theoretical sciences of medicine was aroused and after several weeks we find Henle writing to his family of his whole hearted attachment to his anatomical studies. Thus Henle was drawn into the sphere of influence of the

[15] Engels, Friedrich, Zur Geschichte des Bundes der Kommunisten, In: Marx, Karl-Ausgewählte Werke, vol. 2, Zürich, 1934, p. 24; also Jacobi, A., Collectanea.
[16] Merkel, *loc. cit.*, pp. 4-5.
[17] Pagel, Julius, Geschichte der Medizin, Berlin, 1898, p. 376.
[18] Cf. Merkel, p. 5; Kussmaul, p. 249.
[19] Cf. Merkel, p. 5.

new scientific research which began to arise in Germany coincident with the downfall and disruption of the romantic philosophy and science.

The full significance of the scientific revolution upon which the biological disciplines were entering when Henle began to study medicine will more easily be understood if we digress to survey the social and intellectual development which had preceded it. The late Middle Ages and the early sixteenth century had seen the first changes in the relations of the various classes of the medieval social structure. Due to improved means of producing wealth, technical improvements in industry and greater ease in commercial intercourse a new social class began to grow. As this new class, the bourgeoisie, continued to grow in economic strength throughout the seventeenth and eighteenth centuries there followed a period of increasing self consciousness. A demand for social recognition and an assertion of new rights impelled its intellectual advance-guard to an investigation of the bases of power of the ruling classes, with an intellectual reconstruction of all traditional values as a logical and natural consequence.

A social result of the evolution of the middle class may be seen in the rise of an influential intellectual class. The feudal classes based their privileges on an appeal to traditional authority and custom. To justify their pretensions to power the newly selfconscious moneyed classes could not rely upon any tradition but had to appeal to a new authority—reason.[20]

At the beginning of the eighteenth century these political, economic and intellectual energies, which had begun to shape the life of western Europe at the close of the Middle Ages, had apparently reached a point of equilibrium. Superficially it was an age of culmination—an Augustan age. Under the elegantly brittle surface of the period, social forces, scientific and industrial, were gathering however, which were to discharge themselves in the violent political and social convulsions at the end of the century. The French Revo-

[20] This sketch of the economic and social development is based on the accounts of
a) Franz Mehring, Deutsche Geschichte seit dem Ausgange des Mittelalters, Berlin, 1931.
b) Preserved Smith, History of modern culture, v. 2, New York, 1934.

lution which began in 1789 marked the beginning of the great upheaval which ushered in the nineteenth century.

The economic development of the age had given an increased drive to the progressive demands of the bourgeois class. The evolution of this social group had not proceeded at the same pace in all countries. Due to this fact its struggle for liberation took different forms in France and Germany. In the former country where the bourgeois class was strong it sought to seize political power whereas in Germany the political immaturity of this group caused it to sublimate its desires and to create for itself in literature and philosophy an ideal picture of the bourgeois world.

The social and intellectual atmosphere in Germany had remained static and was that of the middle ages. A milieu of political reaction stifled every sign of initiative on the part of the German bourgeoisie. Germany lagged far behind England and France in its economic development. Not one third of the German population lived in cities and in the urban communities the guilds held control and stifled the development of industry and trade. Politically the German people had been unable to achieve unity and had remained in that loose confederation known as the Holy Roman Empire.

The intellectual expression of these conditions was therefore varied. In France and England a materialistic philosophy based upon sober, rational analysis was developed, whereas a disunified Germany produced a philosophy tending to compensate for a lack of material and national unity by striving toward a conception of spiritual unity. These basically contrasting main currents of thought permeated all intellectual endeavor. The philosophy of materialism which developed in France was based on the doctrines of Hobbes and Locke and the scientific research of the seventeenth and eighteenth centuries. It conceived of life as an interplay of material forces and expressed its ethical teaching in the doctrine of a state of blessedness which is common to all mankind. This philosophy was best known through d'Holbach's popular work " Système de la Nature." [21] The influence of this doctrine was not unfruitful for the further progress of biological and medical science and with the

[21] Nordenskiöld, E., History of Biology, New York, 1928, p. 268; also see Becker, C. L., Heavenly City of the 18th century Philosophers, New Haven, 1932.

collapse of the feudal system and the triumph of the new capitalist economy under the Republic and the first Empire we find the biological sciences in France developing on the basis of a sober realism opposed to all speculation.

In Germany the pervailing intellectual tendency expressed itself as Romanticism; not unlike the French Revolution it was essentially a revolutionary movement, an expression of protest.[22] As the full impact of the French Revolution struck the decrepit Holy Roman Empire it collapsed like a house of cards. Realising their political impotence the German intellectuals fled to a realm of esthetic illusion. The general tendencies that favored romanticism were enhanced by the economic backwardness of Germany. The romantic philosophy saw nature as the expression of spiritual powers and sought for connections in phenomena where apparently none existed. This attempt to conceive of natural phenomena as the modes of appearance of a vital entity was essentially mystical in character and stemmed from the doctrines of Paracelsus, Jacob Böhme and Swedenborg. Romantic scientists delved into the hidden depths of mystical, occult doctrines and sought to penetrate "die Nachtseiten der Natur." [23] Imagination tore itself loose from the reins of sober criticism and dared the boldest speculations in biology and medicine. Novalis, whose writings are the source of many of the ideas of the romantic medicine, expressed the viewpoint of this movement when

[22] Wernaer, R. M., Romance and the Romantic School in Germany, New York, 1910, p. 25.

[23] Huch, Ricarda, Die Romantik, Leipzig, 1920, v. 1, p. 380; the following quotation from Tieck presents the essential view of the romantic school.

> "In innere Tiefe der Natur zu schauen
> Da sah ich was getrennt zusammenhängen
> Und was dem blöden Auge einig scheint
> In ferne Grenzen auseinander fliehen
> Wie Stein' im Abgrund die Metalle formen,
> Wie Geister die Gewächse figurieren
> Wie sich Gedank' und Wille korporieren,
> Wie Phantasie zum Kern der Dinge dringt,
> Durch Einbildung unmögliches gelingt
> Wie jeder Stein uns stumme Grüsse beut,
> Alle Dinge nur sind der Geisterwelt ein Kleid"
>
> Huch, p. 170.

he wrote: "Ein Poet versteht die Natur besser als ein wissenschaftlicher Kopf." [24]

Novalis, whose medical ideas were derived from the modified Brunonianism taught by Röschlaub, in turn influenced Schelling the founder of the "Naturphilosophie." [25] The latter's polarity theory, by means of which he attempted to establish the subjective and objective identity of all natural phenomena, exerted a most baneful influence on medicine and biology.[26] Fanciful reveries and mystical speculation took the place of experimentation and observation. Disease was considered ethically inferior; inflammation was looked upon as an egoism of nature. Ringseis in Munich saw disease as the result of the fall of man and treated it with prayer and the sacraments.[27] The followers of the Natural History School thought of a disease as a parasite, independent of the animal organism, leading its own existence and battening upon the animal host. They therefore sought to name and classify diseases in a taxonomic system much as the naturalist might study zoology or botany.

The Schellingian philosophy soon gave way to the Hegelian, with its dialectic method, but by 1830 the romantic philosophies had run their course and were being internally disrupted. New tendencies began to assert themselves in German biology and medicine.

The advent of a more realistic conception of life in Germany during the third decade of the nineteenth century is closely related to the industrial development which began at this time. Particularly in the Rhine province, which is today one of the most industrialized regions in Germany, industry and politics were in a state of effervescence. The long dormant bourgeoisie were beginning to stir; old institutions, hardened with age, had become more and more burdensome and confining. The new class, hoping to rule the state, demanded all the privileges of the ruling class. Intellectual unrest was a characteristic of the period, as is likely to happen during periods of social and political unrest. In the biological and medical

[24] Diepgen, P., Novalis und die Romantische Medizin: Klin. Wochenschr. 13: 39, Sept. 19, 1934, p. 1403.

[25] Cf. *ibid.*

[26] Garrison, F. H., Introduction to the History of Medicine, 3 Ed., Philadelphia, 1922, p. 408.

[27] Kussmaul, A., Erinnerungen eines alten Arztes, Stuttgart, 1931, pp. 253, 261.

sciences the result was a movement to reconstruct these disciplines along scientific lines. The leader of this movement was Johannes Müller, " who was also the greatest German physiologist of his time and like Haller and John Hunter, one of the great all round medical naturalists." [28]

Müller attempted to develop medicine along physiological lines. Magendie, the French experimental physiologist, had initiated this line of thought. He looked upon physiology and pathology as two aspects of the same problem. Pathological phenomena appeared to him as the expression of normal function under altered conditions. " La médecine n'est que la physiologie de l'homme malade." Magendie demanded the use of exact experimental methods in the investigation of physiological and morbid phenomena. Johannes Müller advanced similar views with great vigor, consistently and cogently. His influence on the main current of modern German medicine may best be realized by the fact that such men as Schwann, Remak, Traube, Wunderlich, du Bois-Reymond, Helmholtz, Virchow and Kölliker were among his disciples.[29]

Henle studied at Bonn under Müller's guidance and the extent to which the latter's ideas influenced the young student may be judged from the following letter written to his parents around 1830. He writes: " das handwerksmässige Receptschreiben ist gar nicht unser höchster Zweck, und was ein solcher sich erst durch langjährige Erfahrung zu eigen macht, ist bald nachgeholt, wenn man sich bei Allem nach Ursache und Grund fragt. Auch ist dies der einzige Weg, auf welchem man dazu gelangt, etwas freies und selbständiges zu leisten, und nicht blindlings dem folgen zu müssen, was uns der erste beste von seinen Erfahrungen erzählt. Solche Praktiker, denen es eben nur um Praxis zu thun ist, können bei einigem Glück und savoir faire zu einem anständigen Auskommen gelangen, sie werden aber nie etwas schaffen in ihrer Wissenschaft und ich preise den nicht glücklich, der sich mit jenem begnügen kann." [30]

He expresses here the first inkling of that basic conception which

[28] Cf. Garrison, p. 451.
[29] a) Faber, Knud, Nosography, 2 Ed., New York, 1930, p. 59.
b) Magendie, F., Phénomènes physiques de la vie, Paris, 1836.
c) Cf. Garrison, p. 451.
[30] Cf. Merkel, p. 5.

was to be the underlying motif of his later work. Henle recognized that freedom of thought and exact methods of observation and investigation were essential for the advance of biology and medicine. The program of his " Rationelle Pathologie " was an elaboration of this point of view.

The other movement with which Henle came into contact at Bonn was political in nature. In the spring of 1828 he had joined the " Burschenschaft " at Bonn.[81] The wars of independence which the Germans had waged to throw off French rule had given rise to new goals and ideas in the German student body. Many youths had participated in the wars and came back to the Universities as fiery patriots. They abhorred the existing division of Germany into a dozen petty states. For this reason they founded the " Burschenschaft," shortly after 1815, whose motto was: For Honor, Freedom and Fatherland, and whose purpose it was to foster the idea of German unity and the ideal of political freedom.[82] The University of Jena had been the original home of the " Burschenschaft " and from there it had spread to practically all the other German universities. Its founders believed that since it contained all the German students it would be a symbol of German unity, which the members would carry into their later lives and career. Politically their program was to limit the prerogatives of the princes and to obtain some form of constitutional government.[83] They believed that they could obtain such demands by creating a corporative state such as the Holy Roman Empire had been in the Middle Ages. The means to attain these ends were summed up by Jahn, one of the founders of the " Burschenschaft " in the Hippocratic aphorism: Diseases not curable by medication are curable by iron; diseases not curable by iron are curable by fire.[84] The " Burschenschaft " however remained an advance-guard, a movement of students and intellectuals around which no army gathered. Its ideas never crystallized into any clear and definite program but remained romantic medieval dreams crossed with Jacobin wrath and terror.[85]

[81] Cf. *ibid.*

[82] Huch, Ricarda, Alte und neue Götter, Berlin, 1930, p. 34.

[83] Kussmaul, p. 125.

[84] Cf. *ibid.*

[85] Mehring, Fr., Deutsche Geschichte seit dem Ausgange des Mittelalters, Berlin, 1931, p. 118; 142-143.

In the spring of 1830 Henle left Bonn and went to Heidelberg to pursue his clinical studies. Merkel tells us that one of the reasons for his departure was the fact that Henle disagreed with the activities of the " Burschenschaft." [36] The next year saw his return to Bonn where he completed his studies and in 1832 Henle was licensed to practice medicine.[37]

Meanwhile his friendship with Müller had grown steadily closer. In 1831 while waiting for his state examination Henle had accompanied Müller on a trip to Paris where the latter wished to study the work of the French scientists. Henle functioned as his interpreter and was rewarded by the accumulation of considerable scientific experience.[38] Soon after Henle had finished his examinations Müller was appointed to the chair of anatomy and physiology at Berlin as Rudolphi's successor.[39] Henle immediately entered Müller's laboratory and in 1834 the latter made him Prosector.

Henle made the most of his opportunity and soon developed an extraordinarily fruitful scientific activity in anatomy, zoology and pathology. The result was that he soon applied for formal habilitation as " Privat Dozent " with the hope that he might receive a call from another university, Dorpat being a possibility at the time. The reply to his application was an unexpected and unpleasant reminder that he had once been a member of the " Burschenschaft " and he was informed that his political connections, past as well as present, would be closely scrutinized.[40] The harsh actuality of political persecution followed on the heels of this warning; on the night of July 1, 1835, Henle was arrested and imprisoned in the Hausvogtei. Here he remained for six weeks under conditions of which he spoke only with a shudder in his later years.[41] Due to the influence of Alexander von Humboldt he was released from prison at the end of six weeks, but in January 1837 he was finally sentenced to six years of incarceration in a fortress with deprivation of all state office. Again it was due to the good offices of Humboldt that Henle was pardoned in March of the same year.[42] The pardon was

[36] Cf. Merkel, p. 5.
[37] Cf. *ibid.*, p. 6.
[38] Cf. *ibid.*
[39] Cf. Kussmaul, p. 248.
[40] Robinson, Victor, Pathfinders of medicine, New York, 1929, p. 438.
[41] Cf. Merkel, p. 7.
[42] Marchand, Introduction to Henle's Von Miasmen und Kontagien, in: Klassiker der Medizin, vol. 3, Leipzig, 1910, p. 5.

accompanied by his reinstatement as Prosector. Finally in 1838 after the turmoil had quieted it became possible for Henle to habilitate himself as privat dozent with a thesis on the histology of the intestinal epithelium.

The next few years found Henle occupied with his scientific investigations. He spent entire days and nights in Müller's laboratory fulfilling his duties as Prosector and pursuing his anatomical and histological researches. Despite the fruitful activity of this period Henle welcomed the call to occupy the Chair of anatomy at Zürich which he received in 1840. The independence which was thus offered him outweighed all other considerations and he gladly accepted the call to Zürich.[43]

Switzerland was then an oasis of liberty in a Europe ruled by Metternich and the Holy Alliance. In Henle's time it was full of political refugees, radicals and revolutionaries from all parts of Europe. The group of men whom he found in Zürich on his arrival, among them many intellectually active colleagues and numerous political refugees, comprising a great part of the German intelligentzia, pleased him very much.[44] As a man of liberal tendencies Henle felt at home in this atmosphere. Soon after his arrival he became acquainted with his colleague Karl von Pfeufer, who was also a newcomer, having just become clinical professor of medicine. The two men, both about the same age and holding similar political and scientific views, very soon became intimate friends. In such an atmosphere of intellectual liberty Henle spent the next four years.

The year 1840, the same year in which Henle had become professor at Zürich, had also seen the publication of one of his most important books, the " Pathologische Untersuchungen." The book had originally been intended as a text for students who attended his lectures but in the process of writing Henle had expanded it to a preliminary study for his future " Handbuch der rationellen Pathologie." [45] The book consists of four parts dealing with the following topics: 1) von den Miasmen und Kontagien; 2) Ueber Nervensympathie; 3) Verlauf und Periodizität der Krankheit; 4) Ueber

[43] Cf. Merkel, p. 8.
[44] Cf. *ibid.*; Robinson, p. 442.
[45] Cf. Marchand, p. 6.

das Fieber. Henle in the preface tells the reader that the four sections may be considered as a connected whole containing the basic elements of a system of general pathology.

Here I shall concern myself however only with the first section—Von den Miasmen and Kontagien. In this essay Henle formulated, on the basis of deductive considerations, his firm conviction that Contagia Animata, i. e. living organisms were the cause of contagious and infectious diseases. This essay illustrates very well certain social aspects in the development of medical thought, mention of which has already been made at the beginning of this article.

Henle did not base his theory on any experiments of his own but rather on data which had been gathered by numerous observers. Traces of the theory may be found in antiquity. Pliny expresses the opinion that swamp fever is due to the entrance of extremely small organisms into the body. The Arabs seem to have been acquainted with the parasitic nature of scabies. In the seventeen century Athanasius Kircher and Leeuwenhoek had seen infusoria and other living microscopic structures. In 1786 Joh. Ernst Wichmann, a Hannoverian physician, described the itchmite which causes scabies.[6] Agostino Bassi in 1837 found the muscardine of silkworms to be due to plant parasites.[47] In the same years Cagniard de la Tour and Schwann showed that fermentation was due to the action of small organisms—yeasts.[48] A further contribution was made in the very same years by the clinician Johann Lukas Schoenlein, who discovered the parasite of Favus to be a fungus.[49]

On the basis of this considerable material which had been collected by his predecessors, Henle by means of logical and cogent arguments erected and advocated the theory that contagious and infectious diseases were the result of living microscopic organisms. Not content with the erection of this theoretical structure Henle went further and formulated the principles upon which experimental proof of his ideas would be based.

In his discussion Henle states his conviction as follows: "Ich werde jetzt die Gründe anführen, welche beweisen, dass die Materie der Kontagien nicht nur eine organische, sondern auch eine belebte,

[46] Pagel, p. 312.
[47] Cf. *ibid.*, p. 393.
[48] Nordenskiöld, p. 431.
[49] Cf. Pagel, p. 393.

und zwar mit individuellem Leben begabte ist, die zu dem kranken Körper im Verhältnisse eines parasitischen Organismus steht. Dem Prinzip nach stimmt diese Ansicht überein mit der alten Theorie vom Contagium animatum, die oft bekämpft, und in verfeinerter Form immer wieder neu aufgetreten ist, denn in der Tat mussten die Erscheinungen im Verlaufe der kontagiösen Krankheiten zu allen Zeiten auf dieselben führen. Dagegen will ich mich verwahren gegen eine scheinbare Uebereinstimmung, welche, oberflächlich betrachtet die Lehre von dem Leben des Kontagiums mit einer pathologischen Theorie zeigen möchte, die als Residuum der Naturphilosophie in Deutschland noch viele Anhänger, und unter denselben Männer von grossem wissenschaftlichem Einfluss zählt. Nicht das Kontagium, sondern die Krankheit wird . . . als ein parasitischer Organismus, oder zweideutiger noch, als ein parasitischer Lebensprozess betrachtet. Das Kontagium ist der Keim oder Same dieses parasitischen Wesens mit geborgtem Körper, durch welchen dasselbe sich fortpflanzt. Das Kontagiöswerden miasmatischer Krankheiten ist der eigentliche Hebel und die Stütze dieser Theorie, und wird nach einer unklar angewandten Analogie so erklärt, dass die Krankheit in ihrer vollsten Entwicklung zeugungsfähig werden könne, wie jeder Organismus erst in der Blüte seiner Kraft zur Zeugung geschickt sei. Um die Basis dieser Lehre selbst vom theoretischen Standpunkte zu bekämpfen, müsste ich mich zu weit von meinem Gegenstande entfernen, doch will ich nicht verschweigen, dass ich sie, trotz der Konsequenz, womit sie ins Einzelne durchgeführt wurde, immer eher für eine geistreiche, ja mitunter nur im Interesse des Witzes verfolgte Vergleichung, als für eine eigentliche Erklärung angesehen. Hier kommt es mir nur darauf an, den Unterschied zu zeigen, der zwischen dem Kontagium in unserem Sinne und dem lebendigen Krankheitssamen oder Keim im Sinne der gedachten Schule besteht. Der Unterschied aber lässt sich mit wenigen Worten so bezeichnen, dass es nach unserer Theorie nicht die Krankheit, sondern die Krankheitsursache ist, welche sich fortpflanzt. Um ein grobes Beispiel zu wählen, so denke man sich, dass ein Dorn, in den Finger eingedrungen, Entzündung und Eiterung erzeuge. Eitert der Dorn heraus, so kann er in den Finger eines anderen Individuums eingestochen werden, und dieselbe Krankheit zum zweiten

Mal erzeugen. Hier würde also durch den Dorn nicht die Krankheit, auch nicht ein Produkt derselben, sondern der Reiz, der sie hervorbrachte, übertragen. Und vorausgesetzt, der Dorn könne im kranken Körper sich vervielfältigen, oder jeder kleinste Teil wieder zum Dorn werden, so könnte man durch Uebertragung jedes kleinsten Teiles desselben in anderen Individuen dieselbe Krankheit, Entzündung und Eiterung erregen. Nicht die Krankheit ist der Parasit, sondern der Dorn. Die Krankheiten gleichen einander, weil die Ursachen einander gleichen. Das Kontagium in unserem Sinne ist also nicht der Keim oder Same der Krankheit, sondern der Krankheitsursache, wie z. B. das Ei einer Taenia nicht das Erzeugnis der Wurmkrankheit ist, . . . auch nicht das Erzeugnis des Individuums, welches an der Wurmkrankheit leidet, sondern desjenigen parasitischen Körpers, der, gleichviel wie, zuerst in der Welt gekommen, jetzt sich durch Eier fortpflanzt, und die Symptome der Wurmkrankheit, wenigstens zum Teil, bedingt. Nicht der Same der Krankheit, sondern der Krankheitsursache wird geimpft; die Krankheitsursache vermehrt sich in dem kranken Körper, und wird am Ende der Krankheit wieder ausgeschieden. Ob wirklich als Keim, als Ei, als Sprosse oder wie sonst, soll jetzt noch nicht weiter gefragt werden; nur nicht als Sperma, denn dann bedürfte es immer noch eines zu befruchtenden Eies, und am wenigsten als ein Samen, der mit dem anzusteckenden Körper die Krankheit erzeugen soll." [50]

Henle's main reasons are that in cases of infectious disease the morbid matter apparently increases from the moment it enters the body leading him to the conclusion that it must be organic in nature since only organisms have such faculties. " Die Gründe, welche das individuelle Leben der Kontagien beweisen, sind folgende:

I. Die Fähigkeit, sich durch Assimilation fremder Stoffe zu vermehren, kennen wir nur am lebendigen organischen Wesen. Keine tote, chemische Substanz, auch nicht organische vermehrt sich auf Kosten einer anderen; . . . " [51] Another important point which Henle advances is that the quantity of morbid matter is out of proportion to the effects it produces. " Die Wirkung der Kontagien

[50] Henle, Jacob, Von den Miasmen und Kontagien, in: Klassiker der Medizin, vol. 3, Leipzig, 1910, p. 25 f.
[51] Cf. p. 27.

wurde auch darin mit der Gärung verglichen, dass die Quantität des Effektes in keiner Beziehung steht zur Quantität des angewandten Fermentes. Ein Gran Varizellenstoff mit einer halben Drachme Wasser, eine in verdünnten Varizellenstoff getauchte Nadel steckten noch an. Diese Wirkung durch ein Minimum hängt von der Vermehrungsfähigkeit des Agens ab, wie bei der Gärung und Fäulnis erwiesen ist, und ist also ein weiterer Beweis für die lebendige Natur der Kontagien." [52]

Still another reason advanced by Henle to support his theory is that a certain period of incubation usually precedes the outbreak of the disease. " Der genau typische Verlauf der miasmatische-kontagiösen Krankheiten, und die Verhältnisse im Verlaufe der entsprechenden Epidemien selbst scheinen für eine selbständige zeitliche Entwicklung der Krankheitsursache zu sprechen, wie sie nur organischen Wesen zukommt. . . . Die akute Entzündung verläuft allerdings typisch, und insofern könnte man den regelmässigen Gang der miasmatisch-kontagiösen Krankheit in dem Anteil der Hautentzündung suchen. Aber die Krankheit besteht nicht immer aus einer einfachen Entzündung. Es folgen sich in der Zeit oft mehrere Eruptionen. Und ausserdem scheint dennoch der Verlauf der Entzündung mehr nach ihrer Heftigkeit und der individuellen Anlage zu variieren, als miasmatische Krankheiten es tun. Endlich liegt auch nie ein solcher Zeitraum zwischen Verwundung oder chemischer Reizung und Entzündung, wie zwischen Impfung und Ausbruch des Examthems. Aus dem allen darf man schliessen, dass an dem gesetzmässigen Gange miasmatisch-kontagiöser Krankheiten die Krankheitsursache selbst den wichtigsten Anteil, dass diese selbst eine gesetzmässige, zeitliche Entwicklung habe, eine Eigenschaft, die Charakter nur des Lebendigen ist." [53]

Having logically demonstrated that the causative factor in infectious disease must be a living organism, Henle considers the nature of the as yet unknown parasite and comes to the conclusion that it is very likely a member of the plant kingdom. His theoretical conclusion is based logically on the observations of Bassi and Audouin, who, in their researches on the muscardine—an infectious disease of silkworms—had found the cause to be a fungus, Bothrytis

[52] *Ibid.*, p. 28. [53] *Ibid.*, p. 29.

bassiana. " Nachdem gezeigt worden ist, dass das Kontagium eine mit individuellem Leben begabte Materie ist, die sich nach Art der Tiere und Pflanzen reproduzieren, durch Assimilation organischer Stoffe vermehren kann, und parasitisch auf dem kranken Körper lebt, so entsteht die Frage, wie der bis jetzt noch ungesehene Leib dieses Parasiten beschaffen. . . . Jetzt liegt es fast noch näher, das Kontagium sich mit einem vegetabilischen Leib zu denken, da man täglich mehr die grosse Verbreitung, die rasche Vermehrung und die Lebenszähigkeit der niederen mikroskopischen Pflanzenwelt lernt. Diese Vermutung erhielt eine mächtige Stütze durch die Beobachtungen, welche in den letzten Jahren Bassi und Audouin über eine kontagiöse oder miasmatisch-kontagiöse Krankheit der Seidenraupe, die Muscardine, gemacht haben. . . . Die charakteristischen Zeichen der Krankheit treten erst nach dem Tode auf, indem der Körper sich mit einer weissen, pulverartigen Effloreszenz bedeckt, eintrocknet und sich mumifiziert. Dass die Effloreszenz Schimmel ist durch dessen Berührung oder Inokulation die Krankheit sich mitteilt, wusste man schon durch Foscarini, durch Configliachi, Brugnatelli, und Bonafous. Aber erst durch Bassi wurde darauf angewiesen, dass die Effloreszenz nicht eine zufällig auf dem toten Körper der Raupe gebildete Vegetation, nicht bloss das Produkt der Krankheit, sondern auch die Ursache derselben ist." [54]

Henle, the true scientist that he was, realised however that his conclusions were still extremely hypothetical. For this very reason his book serves the double purpose of bringing together all that is known in support of the theory of the contagium animatum and pointing out the problems to be solved. " Wenn bei dem jetzigen Standpunkte unserer Hilfsmittel die Frage von der Natur des Kontagiums sicher durch die Beobachtung zu lösen wäre, so wäre ein Beweis aus theoretischen Gründen, wie ich ihn hier versucht habe, überflüssig und ein sehr unnötiger Umweg. Leider lässt es sich aber voraussagen, dass ein strenger Beweis aus positiven Beobachtungen noch nicht möglich ist, selbst wenn diese mehr zugunsten unserer Hypothese sprechen sollten, als die bisherigen." [55]

" Es ist ein Uebelstand, der die theoretische Betrachtung über unseren Gegenstand sehr schwierig macht, dass nämlich so wenige

[54] *Ibid.*, p. 46-47. [55] *Ibid.*, p. 52.

Beobachtungen so angestellt und erzählt sind, dass sie mit Zuversicht benützt werden könnten. Es gibt in dem ganzen Gebiet kaum eine Behauptung, die nicht auf Erfahrungen gegründet und wieder durch Erfahrungen widerlegt wäre. Unter diesen Umständen wird man der Theorie raten zu warten, bis die Erfahrungen reifer sind; aber ich glaube vielmehr, dass die Erfahrungen, um zu reifen, des Lichtes einer vernünftigen Theorie bedürfen." [56]

The conditions which Henle had postulated—constant existence of the parasite, isolation from foreign admixtures and reproduction of the disease by means of the isolated parasite—created problems which were difficult to solve and it was not until more than thirty years later that one of his pupils, Robert Koch, was able to fulfil the conditions and furnish definitive proof the Henle's theory was correct. Koch had studied under Henle at Göttingen and for a time he had worked in his institute as a research student. During the period when Koch was daily occupied in Göttingen's famous Theatrum anatomicum with his research problem, investigations were going on there, relating to the pathogenic micro-organisms. One of Henle's research students, Dr. Ripping, had just completed his investigations of various pathogenic fungi and one may assume with a certain degree of probability that in this atmosphere redolent of such influences Koch received many intellectual impulses and ideas relating to the nature of infectious disease.[57]

Students of Koch's life and work have recognized that Henle's personality and ideas exerted a definite influence on his development as a scientist.[58] Ficker says that Henle directed Koch to the problems of infectious diseases. " Von seinen Universitätslehrern sind der Physiologe Meissner und der Anatom und Pathologe Henle für

[56] *Ibid.*, p. 86-87.

[57] Heymann, Bruno, Robert Koch, I Teil, Leipzig, 1932, p. 35, 55.

[58] a) Webb, Gerald, 1) Robert Koch, Annals of Med. History, Nov. 1932, p. 510. 2) Tuberculosis, New York, 1936, p. 97. "Koch proved for the first time in history the postulates which had been suggested by his teacher Henle."

b) Cf. Heymann, p. 53, 55.

c) Ficker, M., Introduction: to Koch, R., Die Aetiologie der Milzbrandkrankheit: Klassiker der Medizin, vol. 9, p. 7.

d) Cf. Pagel, p. 393.

e) Von Brunn, W., Kurze Geschichte der Chirurgie, Berlin, 1928, p. 255.

seine spätere Entwicklung von grösstem Einfluss gewesen: . . . Henle lenkte die Gedanken auf das Problem der Infektionskrankheiten." [59] Koch himself in later life admitted that Henle had aroused his sense of investigation and revealed how deeply grateful he was to his teacher in a remark concerning his student days. He said: " dennoch aber möchte ich einiger meiner damaligen Lehrer in Dankbarkeit gedenken, nämlich des Anatomen Henle. . . . " [60]

The above events are a concrete illustration of certain general considerations which were developed in the first part of this essay. An analytic review of the development of the theory of the " Contagium animatum " substantiates the opinion that medical thought is a social product produced in time and space by a dialectic process. From a broad background of observations gathered by numerous investigators in time and space and sometimes contradictory in character a synthesis arises in the form of an hypothesis which is a provisional or relatively absolute truth conditioned by the historical process. The hypothesis then furnishes a basis for further research on a higher level leading to the discovery of new facts which sooner or later necessitate a new synthesis. Henle recognized this principle when he wrote: " Wenn die empirischen Kenntnisse sich erweiterten, wurden die Erklärungen aus einem herrschenden philosophischen Prinzip unzureichend, das Prinzip gestürzt. Es entwickelte sich der Eifer, mehr zu untersuchen, bis wieder eine grosse Entdeckung Basis einer neuen Theorie wurde. . . . " [61]

After this short digression we shall again turn our attention to Henle and his further work. Henle remained at Zürich for four years, until 1844. During this period, in 1841, he published his " Allgemeine Anatomie." This book, based upon his own microscopic researches, was a complete presentation of the histology of the human organism. This work was, moreover, not just a simple textbook of histology. It was the first comprehensive presentation of histology since Bichat had laid the foundations of this science and therein lies its significance.[62] Kussmaul who studied under

[59] Cf. Heymann, p. 53.

[60] Henle, Jacob, Über medizinische Wissenschaft und Empire in: Zeitschrift für rationelle Medizin, vol. 1, Zürich, 1844, p. 2.

[61] Marchand, p. 6.

[62] Kussmaul, p. 250.

Henle at Heidelberg wrote that the "Allgemeine Anatomie" opened a new world of anatomy for himself and his contemporaries "Eine neue anatomische Welt tat sich uns jungen Medizinern auf in dem Werke Henle's: "Allgemeine Anatomie," 1841. Es fesselte die Leser fast noch mehr durch die weiten Aussichten, die es eröffnete, als durch das, was es bereits fertig darbot. Sobald die Berufung Henle's bekannt geworden war, trieb mich die Neugier, sein Buch zu lesen. Den Eindruck auf mich kann ich nur mit dem der Liebigschen Schriften vergleichen, ich verfuhr damit wie mit diesen, ich zog es aus und lernte seinen wesentlichen Inhalt auswendig."[63] Henle considered not only the anatomy of the tissues in his work but also their physiology; he therefore included a section on the physiological-chemistry of the organism (Von den Mischungbestandteilen des menschlichen Körpers). In his preface Henle points out that the physiology of the tissues is the basis of general pathology: "die Physiologie der Gewebe (ist) die Grundlage der allgemeinen oder rationellen Pathologie, welche die Krankheitsprozesse und Symptome als gesetzmässige Reaktionen einer mit eigentümlichen und unveräusserlichen Kräften begabten organischen Materie gegen abnorme äussere Einwirkungen zu bezeichnen sucht."[64] Here we have the first inkling of that idea which Virchow was to formulate and express eighteen years later in his cellular pathology.

Early in 1844 Henle received a call to occupy the chair of anatomy at Heidelberg and in the spring of the same year he arrived there together with his close friend Pfeufer, who had also received a call

[63] a) Cf. Marchand, p. 6; Merkel, p. 11.

b) Diepgen, P., Geschichte der Medizin, Berlin, 1919, vol. 3, p. 114. "Die Krankheit ist selbst Leben, Leben unter veränderten Bedingungen, seien nun die Bedingungen durch äussere oder innere Ursachen verändert. Als Ausdruck der Krankheit findet sich eine Veränderung an den Körperzellen. Eine Zelle kann nur aus einer anderen entstehen. Die Aufgabe der Medizin ist es durchaus nicht, alle Krankheiten aus einem einheitlichen Prinzip zu erklären, wie es die Systematiker versuch haben, sondern objektiv mit allen Mitteln, die uns durch Physiologie, Chemie und Physik an die Hand gegeben sind, die Krankheit zu beobachten, auf Grund unserer Kenntnisse der normalen und pathologischen Anatomie auf die Veränderungen zu schliessen, welche die Krankheit im Leben hervorbringt. Dadurch soll man die Diagnose finden, die sich in erster Linie auf die pathologische Anatomie gründet und weiter an der Hand der physiologischen und pathologischen Erfahrung bei der Behandlung vorgehen." (Virchow according to Schwalbe.).

[64] Kussmaul, p. 251.

to Heidelberg. During the last year of their activity in Zürich the two friends had joined forces to issue a medical journal entitled "Zeitschrift für rationelle Medicin." In keeping with this challenging title the first number of the journal contained the program of the two friends in the form of a witty albeit bellicose manifesto written by Henle and entitled "Ueber medizinische Wissenschaft und Empirie."

The article begins with a consideration of the origins of medicine. Henle then goes on to discuss the relation of experience to theory and leading from this to a discussion of the romantic medicine which dominated Germany at the beginning of the nineteenth century. The philosophies of Schelling, Reil and Stark and the medical schools that were based on these doctrines are evaluated and found wanting as far as pathology or practical medicine is concerned. Henle recognizes that the great mistake of the romantic medicine was that speculation was allowed to luxuriate rampantly without being checked by experiment or experience. "Minder günstig war der Einfluss der Naturphilosophie, wo sie sich der Pathologie und praktischen Medizin bemächtigte, aus verschiedenen Gründen, teils wegen willkürlicher, voreiliger, oder missverstandener Anwendung ihrer Grundsätze auf die Erklärung des Faktischen, teils und besonders durch ihre Prätension, den Inhalt empirischer Wissenschaften vom Standpunkt des transcententalen oder absoluten Erkennens a priori zu konstruieren." [65]

With ironic humor Henle goes to point out the fact that too much empty theory was finally the cause of the disintegration and downfall of the romantic school in medicine. The most elaborate theories were propounded by the followers of the Natural History School. K. W. Stark, the founder of this school, believed that a disease was a parasitic organism living upon the diseased host. His disciples elaborated this idea in very minute detail until it was easier to consider the entire matter a huge jest rather than a medical theory to be taken seriously. The result was naturally a reaction which swung to the other extreme—empiricism. All theory was frowned upon, even the most conservative and legitimate. Henle describes this development humorously: "Man wird es unseren naturphiloso-

[65] Cf. Henle, Wissenschaft und Empire, p. 5.

phischen Collegen dereinst nachrühmen, dass sie durch die Kühnheit womit sie den fundamentalen Irrthum von der Selbständigkeit der Krankheit bis ins feinste ausbildeten am meisten zum Umsturz derselben beigetragen haben. Zwar ist eine solenne Widerlegung desselben bis in die neueste Zeit nicht erfolgt, aber ein instinktmässiges Grauen bemächtigte sich Vieler, als sie die Führer auf der schwindelnden Höhe der Theorien sahen. Sie fingen an, umzukehren, und ermütigten sich beim Rückzug indem sie einander von den Gefahren jedweder Reflexion und von der süssen Beruhigung erzählten, welche das bescheidene Loos der Empirie gewährt. . . . "[66]

Henle goes on to point out the fact that the empiricists, due to their total neglect of all theory, have wandered into a blind alley. Their preoccupation with the sypmtoms of disease and their consequent failure to study the diseased organism led them to consider the symptoms as attributes or functions of the disease. The result was that these physicians treated only symptoms and gathered the symptoms in groups and families resembling zoological and botanical classifications.[67]

In contradistinction to both of these medical systems Henle announces the appearance of a third method of approach to the phenomena of health and disease. This method stands, in a manner of speaking, between the philosophical romantic medicine on the one hand and empiricism on the other. Henle's prediction that this conception would soon occupy a significant position in medicine was soon to be fulfilled. This method, which he called " rational," in contradistinction to the other types of approach, was not concerned with the description of symptoms or the construction of intricate metaphysical theories of disease but rather with comprehending the relation of symptoms to the lesions of the internal organs. The explanation of these organic lesions was to be sought in the pathologic physiology of the organism. Thus Henle described the aims of the " rational medicine ": " Ich will diese Methode die *rationelle* nennen, weil sie die Absicht hat, sich sowohl von den Ursachen der Phänomene, als der Wirkungsweise der Mittel Rechenschaft zu

[66] *Ibid.*, p. 10.

[67] *Ibid.*, p. 21-22.

geben. Sie bemüht sich die Symptome in ihrer Abhängigkeit von einander und in ihrem Zusammenhange mit inneren organischen Veränderungen aufzufassen und diese Veränderungen zu begreifen als Folgen abnormer äusserer Einwirkungen auf die mit eigenthümlichen Kräften begabte organische Materie. Aufschlüsse hierüber erwirbt sie sich auf doppeltem Wege mittels der pathologischen Anatomie und des Experimentes. Durch die Coincidenz gewisser Krankheitserscheinungen mit bestimmten materiellen Veränderungen wird sie zur Annahme eines ursächlichen Verhältnisses zwischen beiden geführt; experimentierend setzt sie, so weit es möglich ist, willkürlich die Ursache, und versichert sich, indem sie die Folgen beobachtet, der Richtigkeit ihrer Schlüsse. . . ." [68]

Henle's conception of the manner in which medical research should be pursued shows definitely the influence of the scientific revolution initiated by Magendie and Johannes Müller.[69] Medicine, Henle maintained, could only become a real science on the basis of experience clarified and made understandable by intelligent criticism. Medicine must be founded on the secure basis of physiology and pathology. Without the diligent use of the microscope and the scalpel, without exact clinical observation and laboratory experiments this is impossible. Without the microscope important facts would have remained unknown. "Die wichtigsten Thatsachen verdankt daher die Pathologie dem Gebrauche des Mikroskops. . . ." [70] The "rational" physician analyses the diseases and their symptoms in the light of pathological physiology. Henle defines pathology in the same manner as Magendie had done: pathological phenomena are the expression of normal function under altered conditions.[71] "Die Erforschung krankhafter Zustände und der Mittel zu ihrer Beseitigung . . . gründet sich auf die Physiologie, ja sie ist im Grunde mit ihr identisch. Allerdings definiert man Physiologie als die Lehre von den normalen Lebenserscheinungen und Pathologie als die Lehre von den Funktionen des kranken Körpers. Aber Krankheit . . . ist nur die Folge abnormer äusserer Einwirkungen auf die mit eigentümlichen Kräften begabte und nach einem

[68] *Ibid.*, p. 23.
[69] See above note 29.
[70] Henle, p. 24.
[71] See above note 29.

bestimmten Typus sich entwickelnde organische Substanz . . ." [72]

The final goal of all medical research according to Henle is to be able to explain vital phenomena in terms of physics and chemistry. "Der letzte Zweck ist . . . soweit es möglich ist, [physiologische und pathologische Facta] auf physikalische und chemische Processe zurückzuführen und sie dadurch mit den Erscheinungen der todten Natur unter gemeinsame Gesichtspunkte zu bringen . . ." [73] In this respect he is in complete agreement with Emil du Bois-Reymond, who, in 1848, wrote to Karl Ludwig: "es könne nicht fehlen, dass dereinst die Physiologie ganz sich auflöst in organische Physik und Chemie." [74]

The conditions demanded by Henle seem so self-evident and justified to-day that the reader may wonder at the necessity for the energy with which he advanced his views and the keen dialectics and trenchant wit with which Henle defended them so stoutly. A short digression to survey the scientific as well as the socio-political conditions, which formed the background for Henle's article, will be necessary in order to fully appreciate the significance of his manifesto.

The period was one of brutal repression and consequently of general unrest. The revolutionary storm clouds, which four years later, in 1848, were to break over all of Europe, were gathering on the horizon. Revolutionary ideas were rife in both the political and scientific spheres. In the forties of the last century, medical science in Germany had not yet severed its connection with superstition and charlatanry. Despite the vigorous reform movement initiated by Müller much still remained to be done. Medicine at this time was in a state of transition. Many of the older physicians, who, in their youth, had imbibed the metaphysical theories of the romantic medicine, were still of the opinion that useful medical knowledge could be deduced from aprioristic general principles. Some of these men occupied official positions and exerted a decisive but baneful influence on the development of medicine in Germany. In Bavaria the all-powerful Obermedizinalrat Ringseis, who saw disease as the

[72] Henle, p. 28. [73] *Ibid.*, p. 31.

[74] Kronecker, Hugo, Carl Friedrich Wilhelm Ludwig, Berl. klin. Wochenschr. XXV, 466, 1895.

result of man's original sin, forced medicine to subordinate itself to theosophy. Under such conditions where intellectual revelry in clouded sensations was prevalent, one is not surprised to find that the infected mental atmosphere produced many strange and peculiar systems. The only merit of some of these systems was that they were a genuine protest against existing maladjustments.

These doctrines, misguided and quackish as they were, held out some hope of cure to the suffering and the diseased, whereas, scientific medicine during this period, influenced by the therapeutic nihilism of the Vienna school, failed to answer the needs of the sick. While the new Vienna school had been developing medicine on pathologico-anatomical lines, it also began to clean the Augean stables of therapy but, as very often occurs in such reform movements, it went too far and in place of the polypragmasia which it is so rightly condemned it preached a therapeutic nihilism. The result was that the public was compelled to turn to purveyors of nostrums, dealers in animal magnetism, water cures, exponents of Hahnemann's homeopathic doctrines or the empiricism of Rademacher.

Johann Gottfried Rademacher was an unpretentious, straightforward and plainspoken countrydoctor, who, after having practiced medicine for many years in the small village of Goch, published a book in which he advanced a " new " empirical system of medicine. This doctrine was however only an elaboration of Paracelsus' doctrine of signatures. According to Rademacher diseases are diagnosed by the remedies which cure them. The correct remedy is to be found empirically. Thus he describes lung, liver, spleen etc. remedies. The other influential empiric doctrine of the period was produced by Samuel Hahnemann. His system was based on the therapeutic axiom of " similia similibus." As an empiricist Hahnemann considers removal of symptoms to be synonomous with cure. The essence of the pathologic process does not concern him. The only merit of these systems is that in their erring way they were a protest against the extremes of the Naturphilosophie.[75]

In this atmosphere of error and reaction, the effect of Henley's manifesto was revolutionary. The article was eagerly read by the progressive and liberal students and physicians, who recognized in

[75] Cf. Diepgen, Gesch. d. Med., vol. 3, p. 84, 108.

his ideas the same principles for which they were striving. Kussmaul tells of the eagerness and great interest with which Henle's article was read by the students at Heidelberg. When it became known that Henle had received a call to Heidelberg his arrival was most eagerly awaited. Kussmaul writes: " Mit grosser Spannung sahen wir der Ankunft Henle's entgegen . . ." [76] The academic youth of this pre-revolutionary period was animated by a progressive and bellicose spirit. They recognized the revolutionary spirit in Henle's analysis of the ruling medical doctrines and it was with sincere rejoicing that they greeted the lash of criticism with which he castigated the reactionary obscurantists. Kussmaul describes the situation: " Man begreift, dass die medizinische Jugend der vormärzlichen Zeit, die ein fortschrittlicher, kampflustiger Geist beseelte, mit Jubel das Schwirren der Geissel begrüsste, die der witzige Anatom über den Häuptern der Dunkelmänner schwang." [77]

Henle soon became the idol of the Heidelberg student body. His academic and political past was well known and the knowledge that he had been a member of the Burschenschaft and had been imprisoned for this reason contributed no little to endear him to the students. They honoured him as a fearless, liberal scholar and during the winter of 1844-45 they serenaded him as a token of their esteem.[78]

The ideas of the " rational medicine " began to spread throughout Germany and played a large part in preparing the way for the amazing development of German medicine during the second half of the nineteenth century. Karl Thiersch, the famous surgeon, who was an instructor at the university in Munich during this period, relates that he and his colleagues were filled with a happy and joyous feeling of deliverance as the " rational medicine " began to spread through that stronghold of reaction, where until then Ringseis had treated the results of man's original sin with a combination of emetics, blood-lettings, holy sacraments and prayers.

The year 1848 drew near. A wave of revolution rolled over Europe and affected all activities of society. Many mental cobwebs were swept into the dustbin of history among them those elements of German medicine which had impeded its progress.

[76] Kussmaul, p. 251. [77] *Ibid.*, p. 253. [78] *Ibid.*, p. 254.

The revolution was defeated and in 1852, as a result of the reaction which followed, Henle was forced to leave Heidelberg. In the same year he moved to Göttingen where he occupied the chair of anatomy, which had been vacated by Langenbeck. Henle remained at Göttingen, occupied with his anatomical researches, until his death in 1885.[79]

The purpose of this study has been to examine Jacob Henle's medical thought with particular emphasis on its social aspects. The problem was approached with the intention of ascertaining the relation between Henle's ideas and the realities of the social scene in Germany during the first half of the nineteenth century. The evidence accumulated in this paper tends to show that the contemporary social structure had a definite influence on the development of his thought. Early in life Henle had come into contact with the contemporary revolutionary currents, both in politics and science. Influenced by these movements he became an exponent of new ideas and ideals in medicine. Henle thus helped to prepare the way for the development of a truly scientific medicine in Germany.

A more general result of this study has been to emphasize the fact that medical history must be apprehended in its relation to all social activities and must be regarded as an aspect of the whole. It is for this reason that the investigation of medical thought in relation to social practice is an historical problem of great importance.

[79] *Ibid.*, p. 260-61.

POPULAR MEDICAL KNOWLEDGE IN FOURTEENTH CENTURY ENGLISH LITERATURE *

(PART II)

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THE THEORY AND PRACTICE OF MEDICINE

A.

THE PHYSIOLOGICAL SYSTEM AND THE FOUR HUMOURS

The whole system of mediaeval medicine rested upon the teaching of Galen in relation to the function of the human body and the humoural theory; this theory was closely bound up with the practice of medical astrology.

The physiological scheme which was developed by Galen from the vague Hippocratic theory remained in vogue until destroyed by the researches of Harvey in the seventeenth century. The basis of this theory was 'Nature,' i. e. what we call the vital force of the organism; this was subdivided into three types of spirits:

(1) animal spirits formed in the brain and distributed by the nerves

(2) vital spirits formed in the heart and distributed by the arteries

(3) natural spirits formed in the liver and distributed by the veins.

The scheme presupposed minute pores in the septum of the heart, through which venous blood charged with natural spirits passed from the right ventricle into the left, where it became charged with vital spirits; arterial blood charged with vital spirits became converted into animal spirits in the brain and was thence distributed by the nerves.

According to Constantinus Afer, the three spirits were again subdivided as follows:

* See *Bulletin of the Institute of the History of Medicine*, vol. V, 1937, no. 5, pp. 405-451.

animal spirits (i) interior
(ii) exterior (a) sensus
(b) motus localis (voluntary motion)

vital spirits (i) ministrans (producing emotions such as anger, fear or joy in the heart)
(ii) ministrata (having to do with the contraction and expansion of the heart)

natural spirits (i) generative (a) mutabilis
(b) formitiua
(ii) nutritiua and pascitiua (1) appetitiua
(2) digestiua
(3) contentiua
(4) expulsiua.

References to this physiological system are to found in the literature of the period. The following lines from *The Early South-English Legendary or Lives of Saints* [1] describe the growth of the foetus from seed to three small seed vessels which develop into the vital parts of man, namely the brain, heart and liver:

> Of the hexte bolle [2] comez that brayn: the heorte of thane a-midde,
> The liuere, that is nethemest: heo comez of the thridde.
> This beoth the threo hexte limes: that formest i-kenede beoz,
> And in heom is al ane Mannes lijf: ase (ye) nouthe i-seoth;
> Thare nis non of thulke threo: that hadde any wounde,
> That euereft mighte i-held beo: to libbe anie stounde.

Of these three the heart is the

> . . . membre principal
> of the body. . . .[3]

In 'The Knight's Tale' [4] Chaucer refers to the 'vertu expulsif, or animal' cleansing 'thilke vertu clepede natural' from poison:

[1] 'St. Michael', p. 700-728, ed. C. Horstmann, E. E. T. S. 87, 1887.
[2] highest seed-vessel.
[3] Chaucer, *The Dethe of Blaunche the Duchesse*, l. 494-5.
[4] *Canterbury Tales*, A. l. 2743-56.

Swelleth the brest of Arcite, and the soore
Encreesseth at his herte moore and moore.
The clothered blood, for any lechecraft,
Corrupteth, and is in his bouk [5] y-laft
. . . . . .
The vertu expulsif, or animal
Fro thilke vertu cleped natural,
Ne may the venym voyden ne expelle.
The pipes of his longes gonne to swelle.
And every lacerte [6] in his brest adoun
Is shent with venym and corrupcioun
Hym gayneth neither, for to gete his lif
Vomyt upward, ne dounward laxatif.

Although according to the above physiological system it appears that the 'virtu expulsif' is one of the subdivisions of the natural spirits, Chaucer's statement is technically correct from the mediaeval point of view. According to Curry [7] there was a violent controversy in this scheme of virtues with regard to the location of the voluntary motion of the lungs and the surrounding muscles and nerves in the act of coughing; he bases his theory on the statement of Gilbert Anglicus: [8]

The cough is a movement resulting from the combined action of the 'virtus animalis' and the 'virtus naturalis.' It must employ naturally the instruments of that 'spiritus' which is active in expelling superfluous and noxious matter from the body. The 'virtus naturalis,' in which there is injury, may initiate an impulse to activity in the instruments of the 'spiritus' but it is not of itself able to complete the movement resulting in expulsion; it may incite but not consummate ejection except by employing the mediation of that virtue which has control over the nerves and muscles of the bodily members. It is necessary, therefore, that the initial impulse felt in the tubes of the lungs should receive aid from the 'virtus animalis' before the fumes can be expressed and the noxious matter expelled.

A recent article [9] points out that Chaucer makes no reference to

[5] body. [6] muscle.

[7] *Chaucer and the Mediaeval Sciences*, 1926.

[8] *Compendium Medicine*, Lugduni, 1510, fol. clxxxiv. Vincent of Beauvais presents the same theory of the cough, *Speculum Doctrinale*, xv, cap. LXXXIII.

[9] Aiken, Pauline, 'Arcite's illness and Vincent of Beauvais,' *Publications of the Modern Language Association of America*, Vol. 51, No. 2, 1936.

coughing and that it was gross blood, not phlegm, which had to be expelled:

> the 'virtus expulsia,' whose function it was to expel the noxious humours from the body, had been seriously impaired by the general corruption of the 'virtus naturalis' of which the 'expulsiva' was a part; the 'virtus animalis,' which controlled the voluntary action of breathing and thereby purified the blood, had been rendered impotent by the fact that its channels, the nerves, had been injured. Both these virtues were therefore powerless to expel or to purify the corruption of the 'naturalis,' in whose province lay the vein blood clotting in Arcite's breast.

Chaucer echoes the actual words of Galen with regard to this physiological scheme when he says of Arcite's plight

> Nature hath now no dominacioun;
> And certeinly, ther Nature wol nat wirche,
> Farwel, phisik! go ber the man to chirche.[10]

The notion of man's body being composed of the four elements was familiar to every physician of the day; there are also allusions to it in literature:

> 'Erthe and water, fyre and wynde,
> Thereof is the body wrought.'[11]

> 'Man is mad of al the foure elementes.'[12]

> 'Of erth allan ne was he (Adam) noght,
> Bot of four element(e)s worght:
> Of watur his blod, his fless o lair,[13]
> His hete o fir, hijs and[14] of air.'[15]

> '"Sire Dowel dwelleth" quod Witte "nought a day hennes,
> In a castel that Kynde made of foure kynnes thinges;
> Of erthe and eyre is it made medled togideres,
> With wynde and with water witterly enjoyned.'[16]

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[10] *Canterbury Tales*, A. l. 2758-60.

[11] 'The descryuying of mannes members,' l. 3-4, *Twenty-six Political and Other Poems*, E. E. T. S. 124.

[12] 'Testament of Love,' Bk. I, chap. 9, l. 45, *Chaucerian and Other Pieces. Supp. to the Works of Chaucer*, ed. Skeat.

[13] mud. [14] breath.

[15] *Cursor Mundi*, l. 517-20, E. E. T. S. 57; 59; 62; 66; 68; 99.

[16] *Piers Plowman*, B. IX, l. 1-4, ed. W. W. Skeat. In this passage wind is put

'Four elementz sondri ther be
Lich unto which of that degre
Among the men ther ben also
Complexions foure and nomo.' [17]

Blood was parallel to air; phlegm to water: melancholy to earth: choler to fire. The mixture of prevalent qualities in a man's body determined his complexioun or temperament; Gower gives the characteristics of each complexion:

Of therthe, which is cold and drye,
The kinde of man Malencolie
Is cleped, and that is the ferste,
The most ungoodlich and the werste;
For unto loves werk on nyht
Him lacketh bothe will and myht:
No wonder is, in lusty place
Of love though he lese grace.
What man hath that complexion,
Full of ymaginacion
Of dredes and of wrathful thoghtes,
He fret himselven al to noghtes.
The water, which is moyste and cold,
Makth fleume, which is manyfold
Foryetel [18] slou and wery sone
Of every thing which is to done:
He is of kinde sufficant
To holde love his covenant,
Bot that him lacketh appetit,
Which longeth unto such delit.
What man that takth his kinde of thair,
He schal be lyht, he schal be fair,
For his complexion is blood,
Of alle ther is non so good
For he hath bothe will and myht
To plese and paie love his riht:
Wher as he hath love undertake,
Wrong is if that he be forsake.

---

in place of fire, cf. B. XVII, l. 160, also *Cursor Mundi*, l. 539 ff. It is probable that 'wind' is what we call air and 'air' is what is expressed by the Latin aer which is confused in these contexts with aether and this again with fire. In Sanskrit literature five elements are enumerated: fire, water, earth, air, aether.

[17] Gower, *Confessio Amantis*, VII, l. 385-88.

[18] forgetful.

The fyr of his condicion
Appropreth the complexion
Which in a man is Colre hote,
Whos propretes ben dreie and hote:
It makth a man ben enginous [19]
And swift of fote and ek irous;
Of contek [20] and folhastifnesse
He hath a riht gret besinesse,
To thenke of love and litel may.[21]

Chaucer in his 'Prologue' to *The Canterbury Tales,* describing the 'Frankeleyn' says 'of his complexioun he was sangwyn' and describes the 'Reve' as a 'sclendre colerik man.'

Gower in the Confessio Amantis [22] locates the seat of each complexion in the body: melancholic: spleen; phlegmatic: lungs; sanguine: liver; choleric: gall. Like Chaucer he recognizes the heart as the chief organ of the body—

Nou over this is forto wite,
As it is in Phisique write
Of livere, of lunge, of galle, of splene,
Thei alle unto the herte ben
Servantz. . . .[23]

B.

THEORIES AS TO THE ORIGIN OF DISEASE

As well as the physiology there was also the pathology of the humours: diseases were supposed to be caused by an undue excess of some one quality. Gower refers to this theory:

It may ferst proeve upon a man;
The which, for his complexioun
Is mad upon divisioun
Of cold, of hot, of moist, of drye,
He mot be verray kynde dye:
. . . . . .

[19] quick-witted.
[20] dissensions.
[21] *Ibid.*, VII, l. 401-37. Cf. *The Early South-English Legendary or Lives of Saints,* 45 'St. Michael,' l. 668-693, E. E. T. S. 87.
[22] Bk. VII, l. 449-62.
[23] *Ibid.*, VII, l. 463-89.

Bot other wise, if a man were
Mad al togedre of a matiere
Withouten interrupcioun
Ther scholde no corrupcioun
Engendre upon that unite.[24]

A good example of this humoural pathology is found in ' The Nun's Priest's Tale ':

Swevenes [25] engendren of repleccioun,
And ofte of fume [26] and of compleccioun
Whan humours been to habundant in a wight.
' Certes this dreem, which ye han met to-nyght
Cometh of the greet superfluytee
Of youre rede colera,[27] pardee
Which causeth folk to dreden in hir dremes
Of arwes, and of fyre with rede lemes,
Of rede beestes, that they wol hem byte
Of contekes and of whelpes, grete and lyte;
Right as the humour malencolie
Causeth ful many a man in sleepe to crie
For feere of blake beres, or boles blake,
Or elles blake develes wole hem take.
Of othere humours koude I telle also
That werken many a man in sleepe ful wo;
But I wol passe as lightly as I kan.[28]

In ' The Knight's Tale ' Chaucer describes Arcite's passion as a mania engendered of an excess of the melancholy humour which overflowed into the fantastic cell of his brain, i. e. the cell in the front of his head:

And in his geere for all the world he ferde
Nat oonly like the loveris maladye
Of Hereos, but rather lyke manye,
Engendred of humour malencolik,
Biforn, in his owene celle fantastik.[29]

---

[24] *Confessio Amantis*, Prol. l. 974-87.
[25] dreams.
[26] vapours arising out of the stomach.
[27] red cholera caused by too much bile and blood.
[28] *Canterbury Tales*, B. l. 413-29.
[29] *Canterbury Tales*, A. l. 1372-75.

The humoural pathology was the most important theory of the causes of disease; there were however one or two less important theories:

(a) *The vermiform origin of diseases.*

There are four references in fourteenth century literature to worms corrupting the body. The first describes the punishment of King Antiochus Epiphanes, King of Syria:

> The wreche of God hym smoot so cruelly
> That thurgh his body wikked wormes crepte
> And therwithal he stank so horribley
> That noon of al his meynee that hym kepte,
> Wheither so he awook or elles slepte,
> Ne myghte noght for stynk of hym endure.[80]

The following quotation refers to Herod:

> And right so it plesed unto God that he shulde deye vengeably, bi the leste quicke thing that might be, as bi smale wormes in his handes, in all his membres and body, that ete hym, and made hym forto deye.[81]

According to the *Cursor Mundi* he was afflicted with almost every known disease and

> Ouer-al wrang vte worsum and ware [82]
> And wormes creuld here and thare.[83]

The charm made from the shoulder bone of ' an hooly Jewes sheepe ' availed

> if cow, or calf, or sheepe, or oxe swelle
> That any worm hath ete, or worm y-stonge.[84]

In ' Extracts in Prose and Verse from an Old English Medical Manuscript ' a prescription is found for worms in the body:

> Yif in mannys body vermys grynde,
> Take mylfoly [85] and flour and comyn
> And mengis with eysyl [86] or egyr [87] wyn

---

[80] *Ibid.*, B. l. 3805-10.
[81] *The Book of the Knight of la Tour Landry*, Chap. 81, E. E. T. S. 33.
[82] pus.
[83] l. 11835-36.
[84] Chaucer, *Canterbury Tales*, l. 354-5.
[85] the common yarrow.
[86] vinegar.
[87] pungent.

> And bynde it on ye nowele in a clout,
> And queke or dede ye vermis xal oust.[38]

John Arderne [39] gives three recipes for worms and snakes living in the human body. Usually in the popular medical treatises worms are found either in the teeth [40] or in the ear [41] and occasionally in the eye; [42] there are also several receipes ' For to sle the canker.' [43]

The vermiform theory was common in Shakespeare's time [44] and was prevalent as late as the seventeenth century when William Ramesey, physician in ordinary to Charles II, published a curious book entitled *Erminthologia*.

(b) *Insanitary conditions*, etc.

It seems as if the association of filth and uncleanly personal habits with the origin of disease was only just beginning to be realised in the fourteenth century. Vermin seems to have been common and its absence is one of the blessings of the early paradisaical ' Land of Cockaynge ':

> Nis ther flei, fle, no lowse
> In cloth, in toune, bed, no house.[45]

Evidently it was customary to wash only the head and feet; when Partonope of Blois is sorrowing for Melior we are told that

> His hede, his fete wole he not wasshe.[46]

It is noteworthy that in the fifteenth century, John Russell [47] in

[38] l. 135-40.

[39] *De Arte Phisicali et de Cirugia*, pp. 22, 35, trans. D'Arcy Power.

[40] e. g. ' Extracts in Prose an dVerse from an Old English Medical Manuscript,' l. 131-4, *Archaeologia*, 30, and Henslow, *Medical Works of the XIVth. Century*, pp. 8, 29, 95, 112. Cf. *Leechdoms, Wortcunning and Starcraft of Early England*, vol. 2, p. 51 and *The Regimen Sanitatis Salernitanum* trans. as the *Englishman's Doctor or the School of Salerne* by Sir John Harington, p. 125.

[41] e. g. 'A Middle English Rimed Medical Treatise,' l. 873, *Anglia*, 34 and Henslow, *op. cit.*, pp. 93, 110.

[42] e. g. ' A Middle English Rimed Medical Treatise,' l. 219-21.

[43] e. g. Henslow, *op. cit.*, p. 116.

[44] *Much Ado About Nothing*, Act III, Sc. ii.

[45] l. 37-8, *Early English Poems and Lives of Saints*, ed. F. J. Furnival, Trans. Phil. Soc., 1858.

[46] l. 6654, E. E. T. S., E. S. 109.

[47] Booke of Nurture. In the *Babees Book*, E. E. T. S. 32.

giving quite detailed instructions for the toilet nowhere mentions bathing. The unsightly 'mormale' of Chaucer's 'Cook' was caused partly by uncleanly personal habits [48] although Chaucer does not actually tell us so.

In view of such crude ideas of hygiene it is surprising to find Chaucer connecting the flies in the Cook's shop with filth and disease:

> Of many a pilgrym hastow Cristes curs,
> For of thy percely yet they fare the wors,
> That they han eten with thy stubbel goos;
> For in thy shoppe is many a flye loos.[49]

It is clear from the following lines from *Sir Beues of Hamtoun* that foul and stagnant water was known to engender disease:

> Than cometh a roke [50] & a stink
> Out of the water vnder the brink,
> That men ther of taketh the feuere,
> That neuer after mai he keuere.[51]

In the early fifteenth century translation *Palladius on Husbandry* [52] directions are given for avoiding stagnant water when choosing a dwelling place:

> For ofte of it exhaleth myst impure;
> And fle ther from, in case it myght the quellen.

Foul air is to be avoided:

> The longe-woo cometh ofte of yuel eire
> The stomake eke of eire is overtake.[53]

Incidentally there is a reference in 'The Canon's Yoeman's Tale' to industrial disease; the Host asks

> Why artow so discoloured of thy face

---

[48] See Curry, *Chaucer and the Mediaeval Sciences* (1926), p. 50.
[49] *Canterbury Tales*, A. l. 4349-52.
[50] vapour.
[51] l. 2645-50.
[52] l. 302-4, E. E. T. S. 52; 72. Rutilius Taurus Aemilianus Palladius was a Roman author of the 4th cent. A. D.
[53] *Ibid.*, l. 50.

And the Canon's Yoeman answers:

> I am so used in the fyr to blowe,
> That it hath chaunged my colour I trowe.
> . . . . . .
> And of my swynk [54] yet blered is myn eye.[55]

(c)

In the 'Extracts in Prose and Verse from an Old English Medical Manuscript,'[56] we find the following theory:

> In foure parties of a mann
> Begynnyth ye sekenesse yat yei han
> In heed, in wombe, or in ye splene
> Or in bleddyr, yese iiii I mene.

C.

Astrology Connected with the Origin, Diagnosis and Treatment of Disease

The influence which determined the fundamental 'complexion' of a man's body, i. e. the various proportions of elements which were compounded in its creation, came from the heavens. Each planet had its own peculiar power over the developing foetus and exercised this power at a certain period of pregnancy; furthermore, after birth, each sign of the Zodiac governed a particular part of the body and the diseases afflicting it; each planet also controlled different parts of the body and the mental faculties and had power to protect against different diseases as well as avert some modes of death.[57] Each passing hour, which brought a change in the position of the stars in the signs, saw the human 'complexion' governed by a new celestial influence. Therefore in the diagnosis of a malady it was of the greatest importance for the physician to know something of the patient's nativity and also, by observing the configuration of the stars, to estimate the extent to which the original combination of elements had been upset.

[54] toil. [55] *Canterbury Tales*, G. l. 666-730. [56] l. 1-4.

[57] For details of the jurisdiction of the various signs of the Zodiac and the planets see Camden, 'Elizabethan Astrological Medicine,' *Annals of Medical History*, N. S. 2, 1930 and Mercier, *Astrology in Medicine; with Addendum on Saints and Signs*, 1914.

The science of medicine was considered useless in the Middle Ages without a knowledge of astrology, or the art of divination from the stars, which presupposed a knowledge of the stars themselves, i. e. astronomy. Astrology was a science which had engaged the attention of many great intellects from the earliest times, e. g. Galen declared ' Homicides Medicos Astrologiae ignaros.[58]

Its popularity was prolonged for some time after the fourteenth century.[59] It is interesting to find that many of the prognostications and almanacs of the late sixteenth century containing rules for blood-letting, purging and bathing as well as the common figure of the Anatomical Man with his Zodiacal signs, were made by legitimate practitioners holding both degrees and licenses.[60]

To return to the fourteenth century, the Arabian physicians who exercised a great influence on the medical knowledge of this period had considered astrology to be one of the main bases of medical science and so accordingly Chaucer's ' Doctour of Phisik ' pays great attention to it:

> For he was grounded in astronomye
> He kepte his pacient a ful greet deel
> In houres, by his magyk natureel.[61]

This business of keeping a patient ' ful greet deel in houres ' became immensely complicated when it came to administering medicines and performing surgical operations; in fact in actual practice the number of astrological factors were limited. Arnoldus Villanova [62] enumerates only seven.

Although theoretically the planets were of equal influence, the moon and sun played the more important parts in the actual practice of astrology; in fact, for the average physician the moon alone was

[58] *De Ingenio Sanitas*, lib. VIII, C, 20; see also *Secreta Secretorum*, p. 195-6, E. E. T. S., E. S. 74; the *De Phlebotomia* of the Venerable Bede, V, part II, chap. I, p. 27; Roger Bacon, *Opus Majus*, ed. and trans. R. B. Burke, 1928, Vol. 1, pp. 397, 401, 406.

[59] e. g. Sir George Ripley, *Compound of Alchemie*, 1591; John Halle, *An Historical Expostulation against the Beastlye Abusers both of Chyrurgerie and Physyke, in oure Tyme*, Percy Soc. II; Burton, *Anatomy of Melancholy*, vol. 2, p. 17.

[60] Cf. Bosanquet, *English Printed Almanacks* etc. (Bibl. Soc. Illus. Mon. No. 17).

[61] *Canterbury Tales*, Prol. l. 414. Cf. Joannis de Burgundia, *De Pestilentia Liber*.

[62] A. D. 1235-1312.

the guide to treatment and prognosis. The four humours of the body were supposed to fluctuate in volume and power according to the waxing and waning of the moon; the *Regimen Sanitatis Salernitanum* taught that the months of September, April and May were the best for blood-letting as in these months the moon bears greatest sway. John Arderne [63] advises against cutting in the anus or rectum while the moon is in Scorpion, Libra or Sagittarius. There seems no doubt, however, that the sun claimed almost equal importance:

> After Ypocras, alle sekenez outher is termyned after the mouyng of the mone or of the son. If it be after the mouyn of the mone, so it is termined in the fourtened day, which is endyng of acutez sekenez and begynnyng of cronicez.[64]

Each humour was supposed to be in dominion during a certain period of the twenty-four hours, although authorities were not entirely agreed as to the exact limits of these periods. The old physicians maintained that the blood was in power for seven hours, from 8 p. m. to 3 a. m.; Chaucer, in ' The Squire's Tale ' [65] states that the blood was ' in his domynacioun ' in the early hours of the morning; he was probably following the account of the humours which is given in the *Shepheardes Kalender* [66] and which he may have found in the original French *Calendrier des Bergers*.

An additional reason for studying the aspects of the moon and sun in illness was that they regulated the four critical days, namely the decumbiture, the crises, the judicial days and the intercidal days. The sun and moon governed respectively chronic and acute illnesses. The favourable or unfavourable character of the crises depended largely on whether, on the critical day, the sun or moon was favourably aspected by good planets or unfavourably influenced by bad ones; for during each hour of the twenty-four some particular planet was most powerful and each planet had jurisdiction over different diseases. The author of *Piers Plowman* refers to this planetary influence:

[63] *Fistula in Anno*, p. 16, E. E. T. S. 139.
[64] *Ibid.*, p. 21.
[65] Canterbury Tales, F. l. 345-53.
[66] ed. 1656, chap. XXIX.

Kynd Conscience tho herde and cam out of the planetes,
And sent forth his foreioures [67] feures and fluxes,
Coughes and cardiacles [68] crampes and toothaches,
Rewmes and radegoundes [69] and roynouse scalles,[70]
Byles and bocches [71] and brennyng agues;
Frenesyes, and foule yueles.[72]

Having by a knowledge of astrology discovered

the cause of euerich maladye
Were it of hoot or cold, or moyste or drye

and by an acquaintance with the four humours decided

where they engendered and of what humour

Chaucer's ' Doctour of Phisik ' proceeded to perpetuate the favourable constellation in an astrological image:

Wel koude he fortunen the ascendent
Of his ymages for his pacient.[73]

It is not precisely clear what is meant by the term ' to fortunen the ascendent of his ymages.' Skeat [74] seems to imply that the images, of men or animals, having been made under suitable constellations were treated in some way by means of magic and planetary influences to cause good or evil to the patient. The explanation given by another authority [75] is that all things of a material nature made by the hands of men, receive and retain always the impress of the constellation which reigns at the instant when they are formed. This is especially true of astrological images but in the making of images the physician must pay special attention to the ascendant, i. e. he must place in a favourable position (fortune) both Luna and the lord of the ascendant and place in an unfavourable position (infortune) the lord of the house of death and the malific planets; when completed the image, without further treatment, was

[67] messengers.
[68] heart spasms.
[69] running sores.
[70] filthy scabs.
[71] tumours.
[72] *Piers Plowman*, B. l. 79-84.
[73] *Canterbury Tales*, Prol. l. 417-18.
[74] Note to *The complete Works of Geoffrey Chaucer*, ed. W. W. Skeat; *Canterbury Tales*, Prol. l. 417.
[75] Curry, *Chaucer, and the Mediaeval Sciences*, p. 20 ff.

secured to the person of the ailing man. This practice of image-making is again referred to in *The House of Fame*:[76]

> And clerkes eek, which conne wel
> Al this magik naturel
> That craftely don hir ententes
> To make, in certeyn ascendentes,
> Images, lo, through swych magik
> To make a man ben hool or syke.

To be effective it was necessary that the actual herbs used in medical prescriptions should be gathered when the planets were in particular aspects: e. g. the vervain is to be gathered

> Betwen mydde March and mydde Aprille
> And yet awysyd moste ye be
> That the sonne be in ariete.[77]

In his prescription for the making of a confection called 'sanguis veneris,' John Arderne gives instructions with regard to certain astrological factors which must be considered:

> which blode (an ingredient in the prescription) ow to be drawen out in the ful of the mone, the mone beyng in virgine and the sonne beyng in piscibz.[78]

The 'Fragment of a Poem on the Virtues of Herbs'[79] describes the rosemary thus

> Hyt hotte is in the secunde degree
> Drye in the thredde. . . .

It is remarkable that John of Gaddesden, whose *Rosa Anglica* is full of the false beliefs of the time, makes scarcely any mention of astrological matters.

Gower[80] gives an account of fifteen stars with their corresponding herbs and precious stones; the outcome is, however, apparently no more than that certain herbs and stones possessed the powers of

[76] Bk. 3, l. 175-180.

[77] 'Extracts in Prose and Verse from an Old English Medical Manuscript,' l. 792-4, *Arch.*, 30; see also the lily, l. 983-4, and the marigold, 'A Middle English Rimed Medical Treatise,' l. 162-8, *Anglia*, 34.

[78] *Fistula in Ano*, p. 90.

[79] *Reliquiae Antiquae*, vol. 1, p. 195.

[80] *Confessio Amantis*, VII, l. 1295-1438.

certain celestial bodies and therefore were of wonderful power if only their secret were known.

The position of the celestial bodies was also believed to be of the utmost importance in the control of general afflictions; Saturn controlled pestilence and famine:

> 'And myne be the maladyes colde,
> The derke tresons and the castes olde;
> My lookyng is the fader of pestilence.' [81]
> 'Er fyve yer ben folfult, such famyn schal aryse,
> Thorw flodes and foul weder, fruites schul fayle,
> And so seith Saturne, and sent vs to warne.' [82]

The Black Death was said by astrologers to have been brought about by an extraordinary conjunction of Saturn with other planets, which rarely happened once in a thousand years. According to Pettigrew [83] this was either the conjunction of Saturn and Jupiter in Sagittarius on the 10th of October, or the conjunction of Saturn and Mars, in the same constellation, on the 12th of November.

Gower [84] describes how the Greeks discovered the cause of the pestilence, which came upon them when Agamemnon took Criseide from the city of Lesbon, by means of astrology.

Perhaps the following quotation refers to pyromancy rather than to astrology proper:

> It is known bi philosophris that the sterre herid or beerdid errith fro heuene in his mouyng, & bitokeneth pestilence.[85]

John Mirfeld in the Chapter 'De febribus pestilencialibus' in his *Breviarium Bartholomei* states that comets [86] heralded the approach of the plague.

[81] *Canterbury Tales*, A. l. 2454-69.
[82] *Piers Plowman*, B. VI, l. 325-7.
[83] *On the Superstitions Connected with Medicine and Surgery*, p. 65.
[84] *Confessio Amantis*, V, l. 6458-61.
[85] 'Tractatus de pseudo-freris,' cap. 5[a], *English Works of Wyclif*, E. E. T. S. 74.
[86] Mirfeld must be referring to the smaller comets, as none of the larger ones are to be found in records, such as Stow's *Annales*; Halley's comet appeared in 1380 but this was not a plague year. A mediaeval treatise (Sloane MS. No. 2276, fol. 191-199) includes shooting stars and comets among the warnings of the approach of the plague. Hecker, *Epidemics of the Middle Ages*, p. 16, refers to the great and extraordinary meteors which heralded the Black Death, e. g. a pillar of fire

The last quotation refers to aeromancy:

for philosophris seyn by resoun that it is eir of pestilence when it semeth to reyne & reyneth not, as it fallith bi siche cloudis, for ther letten thi light of heuene & temperen not the erthe bi reyne.[87]

D.

Other Methods of Diagnosis

In the fourteenth century it was Galen's physiological system and not the anatomical structure of the human body which was the starting point of medical science. Two literary quotations refer to anatomy, one maintains that there are 217 bones in the human body, the other states that there are 219:

The bones in a man ben in nombre iicxvii. The veynes ben iii . c . lxv. The tethe in perfyte Age xxxii.[88]

> xxxiii tethe that bethe full kene,
> cc bonys and nyntene,
> ccc vaynys syxty and fyve,
> Euery man hathe that is alyue.[89]

John Arderne displays only two pieces of correct anatomical knowledge:[90] his description of the popliteal space in dead men and the information he had gained as to the position of the superficial veins of the arms and legs. John of Gaddesden knew next to nothing of anatomy.

The study of morbid anatomy, which is the main element in modern diagnosis, was, however, if not encouraged at least not prohibited for Mondino de' Luzzi of Bologna who wrote his *Anothomia*, the first modern work on the subject, in 1316 used to study

at Avignon on 20th Nov. 1348 and a fireball which appeared at sunset over Paris in Aug. 1348. Thomas Vincent in *God's Terrible Voice in the City* mentions a blazing star which appeared before the plague of 1665.

[87] 'Tractatus de pseudo-freris,' cap. 5ª.

[88] 'Of the Seats of the Passions,' *Political, Religious and Love Poems*, p. 37, E. E. T. S. 15.

[89] MS. Rawl. Oxon. Poet. 32, fol. ult. Quoted from a note by Halliwell to one of Lydgate's poems, Percy Soc., vol. 2, p. 30, l. 12.

[90] *Fistula in Ano*, p. 48, l. 36-39; p. 49, l. 12-15.

anatomy by dissection. Salimbene[91] in his *Chronicle* tells us that the Emperor Frederick II fed two men excellently at dinner and then sent one of them to sleep and the other to hunt; the same evening he caused them to be disembowelled in order to see which had digested the meal the better and the physician gave judgment in favour of him who had slept. According to Gower,[92] Nero tried the same experiment on three men, one of whom he ordered to ride a horse, the second to sleep and the third to walk about gently:

> Nero thanne, as the bokes sein,
> These men doth taken alle thre
> And slouh hem, for he wolde se
> The whos stomak was best defied:[93]
> And whanne he hath the sothe tryed,
> He fond that he which goth the pass
> Defyd best of alle was.

There is one reference in the Ancren Riwle[94] to blood-testing: 'no mon ne mei juggen blod wel or hit beo cold.' It is interesting to find that this fact was realized before the discovery of the circulation of the blood; blood must be taken from the circulation before being tested and therefore is cold.

The two chief methods of diagnosis were the examination of the pulse and the inspection of the urine, known as uroscopy:

> He tasted his pous, saw his vryn,
> He seide he knew his medycyn.[95]

The origin of uroscopy is practically co-eval with the genesis of the healing art itself; it was well-known to the Babylonians and the Hindoos and is found in old Sanskrit works on medicine. Its importance was urged by the authorities, both Greek and Arabian,

[91] The Franciscan Salimbene of Parma. He wrote his *Chronicle* in 1288; it contains an incidental reference to a postmortem examination in the year 1286; the first formal account of a definite postmortem examination is fourteen years later.

[92] *Confessio Amantis*, VI, l. 1188-1206.

[93] digested.

[94] p. 118.

[95] Robert Manning of Brunne, *Story of England*, l. 9011-12, Rolls Series; see also Wyclif, Ser. 52, *Select English Works of Wyclif*, vol. 1, p. 115, ed. T. Arnold, 1869-71; also 'Tale of Jonathas and Fellicula,' l. 604, Hoccleve, *Minor Poems*, vol. 1, E. E. T. S., E. S. 61.

of the mediaeval physician and it was practised by the Salernitan physicians. It was in fact a logical method of diagnosis resulting from the humoural theory of disease; the superfluous humours, when excreted cause discolouration of the urine. Eighteen different colours are specified in the chapter on uroscopy in the Breslau 'Codex.' [96]

In the fourteenth century the custom arose of placing exaggerated reliance upon the evidence of the urine. Possibly this was a result of the ban which prohibited priest-physicians from leaving their monasteries to visit their patients but on the other hand all physicians were not priests. There is not doubt however that the physicians often resorted to the expedient of diagnosing and prescribing from the mere inspection of the urine:

> Ermentin lieth seke;
> Speke all softe.
> Men shall bere his urine
> To maistre alfranke.[97]

Much ingenuity was shewn on the part of the physician who became an adept at learning indirectly from the messenger what were the symptoms of the patient.

Chaucer is rather contemptuous of the practise of uroscopy in describing the 'Doctour of Phisik':

> I pray to God so save thy gentil cors
> And eek thyne urynals, and thy jurdones.[98]

And the author of *Piers Plowman* [99] is distinctly so when he makes Liar dwell with the Physicians:

> Thanne loured leches and lettres thei sent
> That he sholde wonye[100] with hem wateres to loke.[101]

We can understand that the practice was bound to gain a hold on the mind of both physician and patient in the fourteenth century from the spectacular point of view and the more disreputable among the

[96] Cf. Albert Kadner, *Ein Liber de Urinis des Breslauer Codex Salernitanus*, 1919.
[97] Caxton, *Dialogues in French and English*, l. 35-40, E. E. T. S., E. S. 79.
[98] *Canterbury Tales*, C. l. 304-5.
[99] B. Text l. 223-4.
[100] dwell.
[101] to examine.

profession certainly made the most of the more questionable aspect of uroscopy:

> He wol wagge his urine in a vessel of glaz
> And swereth that he is sekere than evere yet he was, and sein
> ' Dame, for faute of helpe, thin housbonde is neih slain.' [102]

It was a customary practice for the physician to take the urinal into the full light and to turn it over and over again to see whether or not the appearance of the urine would alter. Master Brendyche of Braban, a quack in the fifteenth century ' Play of the Sacrament ' does not find this necessary:

> he seeth as wele at noone as at nyght
> And sumtyme by a candelleyt
> Can gyff a Judgyment aryght
> As he that hathe nood [103] eyne.

In the hands of such unscrupulous quacks, who even pretended to be able to prognosticate events from a mere glance at the urine, uroscopy became uromancy, lost all scientific value and threw discredit on the observations of the sincere followers of the medical art. Yet this practice by the unqualified continued to flourish in England down to the time of Linacre, the founder of the Royal College of Physicians, who was forced to formulate a statute restraining apothecaries from carrying the urine of their patients to a doctor to obtain his opinion as to a suitable medicine.

The abuse of uroscopy during the Middle Ages tended wholly to condemn the practice. During the sixteenth century however, Paracelsus, by his so-called ' spagyric analysis ' paved the way towards the scientific analysis of our time.

A less important method of diagnosis but one which was closely related to the doctrine of the humours and the four complexions of man was diagnosis from physiognomy. Galen gives a brief study of the science and also speaks of its advantage to the physician; he mentions stiff, straight red hair as a sign of a cold brain.[104]

Gower [105] refers to Philemon as the originator of physiognomy;

[102] A Poem on the Evil Times of Edward II, l. 213-5.
[103] need of eyes.
[104] *Opera Omnia*, 1, p. 325-6.
[105] *Confessio Amantis*, IV, l. 405.

the names of Aristotle, Polemon and Loxus have also been associated with its origin.[106]

The most popular function of mediaeval, as of classical physiognomy, was descriptive and used mainly for judging character;[107] doubtless Chaucer intended the special physical peculiarities of his Pilgrims to be interpreted in terms of character; but in addition to this function, in the fourteenth century physiognomy was a recognised department of medical science. The following lines are from Gower's *Confessio Amantis*.[108]

> Of such Phisique I can a part
> And as me semeth by that art,
> Thou scholdest be Phisonomie
> Be schapen to that maladie
> Of lovedrunke and that is routhe.

John of Gaddesden claimed among his other varied accomplishments to be skilled in physiognomy.

The descriptive side of the science was revived with the publication of Sir Charles Bell's *Essay on the Anatomy of Expressions* in 1806.

E.

Allopathy and Methods Suggesting Homoeopathy

The principles of both allopathy and homoeopathy were recognized in the fourteenth century; but undoubtedly, as the following passages prove, allopathy was the orthodox theory:

> right as maladies been cured by hir contraries, right so shul men warisshe werre by vengeance.[109]

---

[106] Fox, *Mediaeval Sciences in the Works of Gower* (1931), p. 29. Philemon is quoted in Smith, *Dictionary of Greek and Roman Biography and Mythology*, vol. 3 as the physiognomist to whom the pupils of Hippocrates took their master's picture in order to test his skill; it is suggested that he is confused with Polemon of Laodicea, 2nd cent. A. D. who did write a treatise on physiognomy and who is quoted as a physiognomist in Sarton, *Introd. to the History of Science*, vol. 1, p. 271. Loxus is not mentioned in Sarton's work but is mentioned, without any dates in the *Encyclopaedia Britannica*.

[107] See *Secreta Secretorum*, p. 219-236, E. E. T. S., E. S. 74.

[108] VI, . 107-111.

[109] Chaucer, *Canterbury Tales*, B. l. 2209.

For sekenes that o cold es numen [110]
Wit hete it agh to be ouer cummen,
If it of hete be, then agh the leche
Cold medecin tharto teche.[111]

On the other hand the principle of 'similia similibus curantur' was an ancient notion,[112] but one which had never succeeded in superseding the orthodox theory of treatment, although many references to the former principles are to be found in the fourteenth century.

The following lines from *Sir Beues of Hamtoun* suggest the homoeopathic idea that one drug could both produce and cure a given disease:

she knew erbes mani & fale
To make bothe bout & bale.[113]

The Regimen Sanitatis Salernitanum recommended an early morning draught of wine as a cure for potation headaches. The maxim of taking 'a hair of the dog that bit you' was applied literally in the following remedy for the bite of a mad dog:

Yif thou miste haue of the hundys here ley hit ther-to and hit schal hele hit.[114]

The homoeopathic principle was particularly popular in the case of antidotes to poisons; the author of *Piers Plowman* says

For venym for-doth venym and that I proue by resoun.
For of alle venymes foulest is the scorpioun,
May no medcyne helpe the place there he styngeth,
Tyl he be ded and do ther to the yuel he destroyeth,
The fyrst venymouste [115] thorw venym of hym-self.[116]

Mandeville [117] describes the same principle in the case of poisonous

[110] taken.

[111] *Cursor Mundi*, l. 27382-97, E. E. T. S.; cf. 'A Middle English Rimed Medical Treatise,' l. 1652-5, *Anglia*, 34.

[112] The treatise called *On the Places in Man*, generally attributed to Hippocrates, contains some examples of homoeopathic treatment.

[113] l. 3675-6. bout & bale = remedy and mischief.

[114] Henslow, *Medical Works of the XIVth Century*, pp. 18-19, cf. p. 116.

[115] poison.

[116] B. Text, XVIII, l. 152-6.

[117] *The Buke of John Maundeuill*, chap. 21, p. 94, ed. Warner, 1889.

trees ' agayne whilke es na medecyne bot ane; and that es to take the lefes of the same treessez and stampe tham and tempre tham with water and drink it.' Another method of treatment was for the patient to drink his own urine, incidentally drinking the poison which thus became its own antidote.[118]

Induced vomiting is recommended in ' A Middle English Rimed Medical Treatise.' [119] Recipes for inducing fever were very popular, e. g.:

> For [to] do a man have the fevers, and sone do tham away: tak a neder alle qwik, and horned wormys that men calles the nutres neghen [120] and seth tham in a new pote with water, and gider the homur that es abowen, and the grees thu fyndes in the potte, and do it in a clene lome [121] and than sal thu, qwham that thu wille haf the fevers, enoynt his handes within and his fete underneth and his thunwanges,[122] and he sal tremble and qwake als sone; and qwen thou will do hit away, do hym in a fatte ful of hate water upp to the chynne, and [he] sal be delivered al sone.[123]

John of Gaddesden's best-known passage [124] on the treatment of smallpox by the use of scarlet draperies is a good instance of homoeopathic treatment and although it is often selected by his critics [125] as a glaring example of his empiricism it is interesting to compare his practice with the modern Finsen Red Light treatment.

Homoeopathy was not by any means a systematic method of treatment at this time nor was it formulated as such until 1810 by Samuel Hahnemann.

[118] Henslow, *op. cit.*, p. 18.
[119] l. 82-5.
[120] ?
[121] utensil.
[122] temples.
[123] ' Medical Receipts,' *Reliquiae Antiquae*, vol. I, p. 54.
[124] *Rosa Anglica: An Early Modern Irish Translation of a Section of the Mediaeval Medical Text-Book of John of Gaddesden*, ed. and trans. into Modern English by W. Wulff, Irish Text Soc., vol. 25 (1923), 1929.
[125] e. g. Pettigrew, *On Superstitions Connected with the History and Practice of Medicine and Surgery*, p. 66 and Redgrove, *Bygone Beliefs* (1920), p. 26.

F.

Dietetics and Digestive Medicines

In the fourteenth century medical aid was largely in request to relieve the consequences of self-indulgence. In *Piers Plowman*,[126] 'Hunger' says

> 'I wote wele . . . what syknesse yow eyleth
> Ye han maunged over-moche and that maketh yow grone.'

He suggests as a remedy

> 'That thou drynke no day ar thow dyne somwhat.
> Ete noughte, I hote[127] the ar hunger the take,
> And sende the of his sauce to sauoure with the lippes
> And kepe some tyl soper-tyme and sitte nought to longe
> Arise up ar appetit haue eten his fulle.'[128]

Chaucer says of the poor widow in 'The Nun's Priest's Tale'

> Attempre diete was al hir phisik
> And exercise and hertes suffissaunce.[129]

As a result of her wise habits she was never ill

> Repleccioun ne made hire never sik
> . . . . . .
> The goute lette[130] hire no-thyng for to daunce,
> Napoplexie shente nat hir heed.

In 'The Pardoner's Tale'[131] Chaucer laments

> how manye maladyes
> Folwen of excesse and of glotonyes.

Fits of sluggishness and attacks of fever often followed such self indulgence therefore the author of *Piers Plowman*[132] counsels

> Mesure is medcyne though thou moche yerne.

---

[126] B. Text, VI, l. 259-60. [127] command. [128] *Ibid.*, l. 262-6.

[129] *Canterbury Tales*, B. l. 4028-9. These lines are reminiscent of the *Regimen Sanitatis Salernitanum* (see trans. by Sir John Harington, p. 75). Lydgate also gives similar advice in his 'Rules for Preserving Health,' *Minor Poems*, Percy Soc., vol. 2.

[130] hindered. [131] *Canterbury Tales*, C. l. 513-14. [132] B. Text, I, l. 34.

Gower recommends a settled diet and does not believe in diet tinkering:

> To him that wole his hele gete
> Is non so good as comun mete:
> For who that loketh on the bokes,
> It seith, confeccion of cokes
> A man him scholde wel avise
> Hou he it toke and in what wise
> . . . . . .
> For in Phisique this I finde
> Usage is the seconde kinde.[183]

As regards the constituents of the ideal diet, Chaucer's 'povre widwe' lived on

> Milk and brown breed, in which she foond no lak;
> Seynd [184] bacoun and somtyme an eye or tweye.

Perhaps the absence of meat from this diet was due to poverty rather than to careful dieting because there is evidence to shew that meat was considered essential in sickness:

Ye ne schulen eten vleschs ne seim [185] butan ine muchele secnesse.[186]

Mutton, especially, was supposed to be good invalid food:

> His Flesche also is naturalle Resturacion;
> As sum men sayne, afftyr grete sykenes,
> Rosted or sodone,[187] holsum is motune;
> Boylyd with growelle foysune [188] alle expresse,
> Fulle Nutri[it]yffe aftyr A grete Axcesse.[189]

The *Regimen Sanitatis Salernitanum* says that pork was almost as good but only if it were followed by a good draught of wine.

[183] *Confessio Amantis*, VI, l. 649-64. Cf. *Regimen Sanitatis Salernitanum* (trans. by Sir John Harington, p. 109). In the *Secreta Secretorum*, p. 238, the maxim is attributed to Hippocrates.

[184] singed.

[185] lard.

[186] *Ancren Riwle*, p. 412, Camden Soc. 57.

[187] boiled.

[188] plenty.

[189] Lydgate, 'The Horse, the Shepe and the Gosse,' *Political, Religious and Love Poems*, E. E. T. S. 15.

Wine in moderation,[140] of course, was the most popular digestive remedy:

> White wyn of Oseye[141] and red wyn of Gascoigne,
> Of the Ryne and of the Rochel the roste to defye.[142]

John of Gaddesden,[143] quoting Averrois as his authority, explains the digestive virtue of wine as follows:

> wine prevents the food from swimming about the stomach, dispenses the flatulence, provokes the urine and the sweat; and helps nature to expel excess matter.

in short

> Swete wynes kepe my body in hele.[144]

'A Middle English Rimed Medical Treatise' prescribes either betony[145] or fennel[146] for the digestion; the latter is to be taken 'in drage after mete.' 'Dragges' were a kind of digestive powder for weak stomachs and were employed by Chaucer's 'Doctour'; the term was also applied to sweetmeats etc. served in the last course as stomach closers.[147]

A rather curious digestive remedy, namely 'sugerit syropis' is found in 'The Testament of Cresseid.'[148] A similar remedy is referred to by 'Envy' in *Piers Plowman*:

> I myghte noughte eet many yeres as a man oughte
> For enuye and yuel wille is yuell to defye
> May no sugre ne swete thinge asswage my swellynge,
> Ne no diapendion dryue it fro myne herte
> Ne noyther schrifte ne shame but ho-so schrape my mawe.[149]

---

[140] For the evil effects of excess of wine see *The Book of the Knight of la Tour Landry*, chap. 89, E. E. T. S. 33. John Arderne considers wine harmful in any nervous complaint, *De Arte Phisicali et de Cirurgia*, ed. D'Arcy Power, Wellcome Medical Museum, Research Studies in Medical History, No. 1.

[141] Alsace.

[142] *Piers Plowman*, Prol. l. 228-9. Cf. 'The Sqyre of Lowe Degre,' in Ritson, *Metrical Romances*, vol. 3.

[143] *Op. cit.*, p. 89.

[144] *Songs and Carols*, No. 74, Percy Soc. 23.

[145] l. 93.

[146] l. 679.

[147] See Cotgrave's *Dictionary*, 1660.

[148] l. 246-7.

[149] B. Text, V, l. 120-4.

Skeat says that 'diapenidion' answers almost exactly to our barley-sugar [150] and translates it as 'any valuable medicine or expectorant'; but this translation does not fit the context for 'Envy' is undoubtedly suffering from discomfort of the stomach. One would expect such sweet substances to cause biliousness, but it is quite clear that in fourteenth century medicine sweet substances were thought to be good for the stomach.[151] Possibly the remedy is another instance of homoeopathic treatment.

The great importance attached to dietetics in fourteenth century medicine is illustrated by the theory and practice of Henri de Mondeville [152] who called diet the third part of Medicine, surgery and drugs being the other two. It is indisputable that Chaucer's 'Doctour' had made an exhaustive study of dietetics for on this point, at least, he follows his own prescription:

> Of his diete mesurable was he,
> For it was of no superfluitee
> But of greet norissyng and digestible.[153]

G.

Surgery

(1) *Blood-letting*

The practice of blood-letting formed an extremely important part of fourteenth century surgery. In this method of treatment a knowledge of the science of astrology was indispensable to success; John Arderne maintains that

> A cyrurgien ow noght for to kutte or brenne in any membre of a mannes body, ne do fleobotomye wheles the mone is in a signe gouernyng or tokenyng that membre.[154]

Phlebotomy for piles should be done annually 'about the fest of

[150] For a recipe to make penydes see Henslow, *op. cit.*, pp. 121-2.
[151] See *ibid.*, p. 9.
[152] *Die Chirurgie des Heinrich von Mondeville*, ed. Paget, 1892.
[153] *Canterbury Tales*, Prol.
[154] *Fistula in Ano*, p. 16, E. E. T. S. 139.

seynt Michell, before and after onez or twies' and preferably in the evening 'that is in the regnyng of malencolious blode.'[155]

The *Regimen Sanitatis Salernitanum*[156] recommends April, May and September as the best months for blood-letting, excepting the first day of May and the last day of April and September.

The author of the Ancren Riwle[157] is more practical in his directions:

> And ase ofte [four times a year] i-leten blod and oftere yif neod is and hwoso mei beon ther withuten, ich hit mei wel i-tholien.[158]

In the fourteenth century, the theory behind the practice of blood-letting was undoubtedly connected with the humoural theory, i. e. that if an evil humour were in a man's body it could be let out by opening a vein; as the blood flowed it carried with it much of the evil humour so that the rest was thereby purified; as this evil humour was always accumulating it was necessary to be bled at regular intervals in order to keep the body in health.[159]

Blood-letting was the popular remedy for ill-humours arising from surfeit:

> Thu hast, with surfeit, leuyng sobirnesse,
> fful greuously encombred thi corage,
> . . . . . .
> Wherfore the nature of thi maladye
> Wil aske sothly a fleobotomye.[160]

So long as the blood was supposed to be stationary it was a common belief that the particular vein from which the blood was taken altered the result and therefore certain veins were bled to cure certain maladies. 'A Poem on Blood-letting'[161] of the end of the fourteenth century enumerates thirty-two veins, sixteen being in the

[155] *Ibid.*, p. 61.
[156] tr. s. by Sir John Harington. Cf. *The Physicians of Myddvai*, trans. J. Pughe, ed. J. Williams, 1861, p. 57.
[157] p. 423.
[158] suffer.
[159] Cf. Lanfrank, *Science of Cirurgie*, p. 298, E. E. T. S. 102.
[160] 'The Epistle of Grace Dieu,' Hoccleve, *Regement of Princes and 14 Poems*, E. E. T. S., E. S. 72.
[161] *Reliquae Antiquae*, vol. 1.

head and sixteen in the remainder of the body which were bled for the cure of various diseases; in most instances Lanfrank [162] bled the same vein for the same disease.

The popular medical treatises [163] advocate blood-letting; also John Arderne, a surgeon of some repute, treats piles by phlebotomy, taking blood from either the basilic veins or the external saphenous.[164]

Lanfrank [165] refers to the practice of drawing the evil matter to the opposite part of the body by repeatedly bleeding the part which was whole; this method was known as antipasis and its contrary as metacentasis. The practice is also referred to in the Ancren Riwle: [166]

> A man vor uuel thet he haueth he ne let him nout blod othe sike halue, auh deth othe hole half, vorto helen the sike halt.

John Arderne [167] states that this method is to be recommended particularly in bleeding for haemorrhoids as it draws the blood away from the rectum towards which it would naturally flow.

Both John Arderne [168] and Lanfrank [169] agree that blood-letting is best for those who eat and drink too much, are idle and have an excess of blood; Maurus, one of the Salernitan physicians directs that in acute fevers the patient should be bled to unconsciousness. Clearly it was an exhausting method of treatment, because even the author of the *Ancren Riwle*, who is extremely strict in his regimen, counsels rest and nourishment after blood-letting:

> Hwon ye beoth i-leten blod, ye ne schulen don no thing theo threo daws, that on greue.[170]

> Two maner men habbeth neode vorto eten wel & forto drinken wel—swinkende [171] men & blod-letene.[172]

Lanfrank [173] says that children ought not to be bled except in

[162] *Op. cit.*

[163] Prose Extracts, No. 9, 'Extracts in Prose and Verse from an Old English Medical Manuscript,' *Archaeologia*, 30, and Henslow, *Medical Works of the XIVth Century*, pp. 38, 91.

[164] *Op. cit.*, p. 61.

[165] *Op. cit.*, pp. 302-3.

[166] p. 112.

[167] *Op. cit.*, p. 61.

[168] *Ibid.*, p. 60.

[169] *Op. cit.*, p. 298.

[170] p. 423.

[171] toiling.

[172] p. 260.

[173] *Op. cit.*, p. 299.

urgent cases, nor old men nor pregnant women; for the very old or the very young he recommends cupping with previous scarification.[174]

In 'The Knight's Tale'[175] 'ventosyng' or cupping is distinguished from vein bleeding:

> The clothered blood, for any lechecraft
> Corrupteth, and is in his bouk[176] y-laft,
> That neither veyne-blood ne ventusynge,
> Ne drynke of herbes may ben his helpynge.

The cupping instruments were either of horn, copper or glass and they were used either with or without scarification or 'garsing,' i. e. wet or dry cupping. In a popular medical treatise,[177] cupping between the shoulders is recommended for deafness.

In his instruction for the treatment of haemorrhoids by phlebotomy, John Arderne[178] makes an interesting distinction between the clumsy phlebotome and the more delicate and easily manipulated lancet:

> also witte thou that fleobotomye to be done vnder the hele and in saluatella of the handez, oweth noght to be done with a blode iron bot with a lancete, for hurtyng of the synewez, but of that nede make it.

Lanfrank[179] gives special instructions with regard to the cleanliness of bleeding instruments 'thei schulen be clene and clear, & not rusti.'

The popularity of the practice of blood-letting in the treatment of all and sundry complaints is proved by the reference to it in the well known late thirteenth century poem 'The Fox and the Wolf':[180]

> I have leten thine hennen blod;
> Hy weren seke ounder the ribe,
> That hy ne mightte non lengour libe
> Bot here heddre[181] were itake
> That I do for almes sake
> Ich have hem letten eddre blod,

---

[174] *Ibid.*, p. 304.
[175] Chaucer, *Canterbury Tales*, A. l. 2745-8.
[176] body.
[177] Henslow, *op. cit.*, p. 109.
[178] *Fistual in Ano*, p. 61.
[179] *Op. cit.*, p. 299.
[180] *Reliquiae Antiquae*, vol. 2.
[181] vein.

And the, Chauntecler, hit wolde don goed.
Thou havest that ilke ounder the splen,
Thou nestes [182] neuere daies ten;
For thine lif-dayes beth-al ago,
Bote thou bi mine rede do;
I do the lete blod ounder the brest,
Other sone axe after the prest.

Perhaps of all the fashions in medicine, blood-letting enjoyed the longest vogue; as late as the eighteenth century it was the accepted treatment for all fevers and many other illnesses; to-day it is but rarely used.

(2) *Wound Treatment*

It was uncommon for a fourteenth century surgeon to attempt amputations of the larger limbs because the ' venae pulsabiles ' which they regarded as very dangerous, defyed even the cautery; the minor operations of surgery were in the hands of the itinerant quacks, so that the actual practice of the surgeon proper was somewhat limited.

In an age of warfare the most important branch of surgery was wound treatment. In the popular treatment of wounds and broken limbs, charms and herbal medicines were used to a great extent:

To othere woundes and to broken armes
Somme hadden salves and somme hadden charmes,
Fermacies of herbes and eek save.[183]
They dronken, for they wolde hir lymes have.[184]

Henslow [185] gives a very dubious herbal remedy for broken bones:

Take violet and stampe hit with water and drynke hit and hit schal caste out the brokyn bon.

Few surgeons were efficient in the treatment of wounds. The ' sursanure,' or wound of which the surface only had been healed, seems to have been common:

' My wounde abydeth lyke a sursanure ' [186]

---

[182] dost build a nest.

[183] Sage, it was considered one of the most universally efficient of mediaeval remedies.

[184] *Canterbury Tales*, A. l. 2711-14.

[185] *Op. cit.*, p. 28.

[186] ' Floure of Curtesye,' l. 75, *Chaucerian and Other Pieces*, ed. Skeat.

'And wel ye knowe that of a sursanure
In surgerye is perilous the cure.'[187]

Most mediaeval surgeons took deliberate steps to procure suppuration. To gain this end they applied to fresh wounds poultices of grease probably of a similar nature to the following:

Blake shepys wole with Fresche oyle & olyue
these men of Armys with charmys preev hit goode,
At a strayte neede they can wele stanche bloode.[188]

They thrust into the depth of the wound pledgets plastered with irritants to promote suppuration, even when there was no foreign matter to be discharged. Chaucer [189] speaks of a plaster 'which is not tempred with vynegre'; vinegar might very well have been used as an irritant, it was a common ingredient in plasters for wounds and to staunch blood.[190] In 'A Middle English Rimed Medical Treatise [191] leeks with salt, a somewhat irritant combination, 'helpes a wounde to close sone.'

The more progressive surgeons such as Henri de Mondeville washed the wound with wine only. Wine was an old remedy in the treatment of wounds; before Hippocrates it was used by the Good Samaritan.[192] The merit of wine as an antiseptic wash lies in its content of alcohol which is both bactericidal and astringent and on evaporation leaves a protective pellicle of precipitated protein on the raw surface of the wound. According to the author of *Piers Plowman*,[193] however, the Good Samaritan used oil as well as wine:

With wyn and with oyle his woundes he wasshed.

This traditional treatment of wounds represented a mild antiseptic and soothing protective dressing, the wine prevented the growth of germs and the oil protected the wound from dirt; it was only during the Middle Ages that the excessive use of oil became the curse of surgery.

[187] *Canterbury Tales*, F. l. 1112-13.
[188] Lydgate, 'The Hors, The Shepe and the Gosse,' l. 75-7, *Political, Religious and Love Poems*, E. E. T. S. 15.
[189] *The Romaunt of the Rose*, l. 5475.
[190] Henslow, *op. cit.*, p. 30 and Muller, *Aus mittelenglischen Medizin-Texten*, 1929, pp. 60, 90.
[191] l. 33-4. [192] Luke X. 34. [193] B. Text, XVII, l. 69.

It is to the credit of John Arderne [194] that he realised the danger of meddlesome surgery:

> Also ther is another reule in which I have sene erre in my tyme almost al men noght practizours but folez; that is to say of the ofte remouyng of woundez or ulcerez. Siche operacioun for-sothe, spedeth nought, bot letteth couenable effecte of curyng.

In the popular medical treatises [195] urine was sometimes substituted for wine as an antiseptic to clean wounds; the treatment was then continued much in the usual way with an irritant plaster.

The charms and recipes, in these treatises, to staunch blood are too numerous to quote; there is, however, one interesting literary reference to the virtue of the pearl which may be mentioned:

> it is nedeful and noble in staunching of bloode.[196]

In *Morte Arthure*[197] a more modern remedy is used; the 'blode-bande' is probably our 'bandage':

> Us bus haue a blode-bande, or thi ble [198] change.

(3) *Fistula*, etc.

The conditions of life at this period would readily lead to the 'fistula in ano' upon which John Arderne in particular wrote; the long hours in the saddle, weighted down by heavy armour in all kinds of weather, would account for the condition in the knightly class while the sedentary habits and gross feeding would account for it in the religious and civic population. Possibly the boils and abscesses in general were an aftermath of the Black Death.

John Arderne's method of treating fistula was a modification of that of Albucasis; [199] after making a clean incision, he washed the wound with tepid water and applied the white or the yolk of an egg mixed with a little oil of roses and he never changed the dressings

[194] *Fistula in Ano*, p. 87.

[195] e. g. 'Extracts in Prose and Verse from an Old English Medical Manuscript,' l. 240-46. This antiseptic remedy was also used for the eyes. Henslow, *op. cit.*, p. 94; for the canker, *ibid.*, p. 23; for the ears, 'A Middle English Rimed Medical Treatise,' l. 840, *Anglia*, 34.

[196] 'The Testament of Love,' Bk. 3, chap. 1, l. 50, *Chaucerian and Other Pieces*.

[197] l. 2576. [198] hue. [199] d. A. D. 1013.

unless they were soiled. His originality and courage may be best realised by reflecting that his contemporaries had no satisfactory method of treating fistula.

The popular medical treatises have many remedies other than surgical for boils and abscesses; some recipes are to be taken in the form of medicine, e. g. egrimony which ' remouwes postemes dronkyn with wyn '; [200] others, e. g. the lily, are to be ' menged with swynes grece ' [201] and applied in the form of a plaster.

Lydgate [202] refers to a particular kind of boil known as the ' pank ' or ' male de flank '

> A bocche that nedeth a good cirurgian.

The ' Medical Receipts ' printed in *Reliquiae Antiquae* contain two herbal receipts for this complaint:

> take the rotes of rede nettilles and playntayne, and stamp tham wele in ale, and do tharto cray [203] that thir parchemeners [204] wirkes withall, and ger hym drynk hit.

> Another: tak the sedes of the rede dok, and gif hym at ete morn and even, bot kepe hym fra appels etyng.

Surgery was the only branch of the healing art which made any progress during the fourteenth century; both Henri de Mondeville and John Arderne urged that surgery was an art to be learned by actual practice and there are passages in the *Treatises on Fistula in Ano* [205] which prove John Arderne himself a first rate clinical observer.

(4) *Anaesthesia*

An interesting development by the North Italian surgeons of the thirteenth and fourteenth centuries was in regard to the induction of anaesthesia which until recently was regarded as of modern origin; its subsequent total and inexplicable disuse for some centuries is remarkable.

[200] ' A Middle English Rimed Medical Treatise,' l. 601.
[201] *Ibid.*, l. 426.
[202] *Minor Poems*, p. 52, Percy Soc. 2.
[203] chalk.
[204] paper-makers.
[205] e. g. p. 71 ff.; p. 38, l. 11 ff.

Walsh [206] is wrong in stating that the Italian surgeons discovered anaesthesia, because mandragora is mentioned by Pliny [207] ' the juice is given before incisions or punctures are made in the body, in order to ensure insensibility to pain ' and there is also a remarkable passage in the Anglo-Saxon poem *Andreas* which translated into modern English reads ' Afterwards magicians by sorcery stirred together in hatred a murderous draught which perverted the mind, the reason of men.'

According to Walsh,[208] mandragora was the basis of most of the anaesthetics of the Middle Ages but a combination with opium also seems to have been a favourite.[209] Mandragora, as an anaesthetic,[210] is not mentioned to my knowledge in fourteenth century literature but Chaucer has two references to opium:

> ' Yif hym to drynke, whan he gooth to reste
> And he shal slepe as longe as ever the leste;
> The narcotikes and opies ben so strong.' [211]

> ' For he hade yeve his gayler drynke so,
> Of a clarree, maad of a certain wyn,
> With nercotikes, and opie of Thebes [212] fyn,
> That al that nyght, thogh that men wolde him shake,
> The gayler sleepe, he myghte not awake.' [213]

There are many literary references to a narcotic drink called ' dwale '; Chaucer says in ' The Reeve's Tale ' [214]

> To bedde went the doghter right anon;
> To bedde wente Aleyn, and also John;
> Ther nas na moore; hem needede no dwale.'

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[206] *Mediaeval Medicine*, 1920, p. 100.

[207] *Natural History*, Bk. XXV, chap. 94, s. v. mandragora.

[208] *Op. cit.*, p. 105.

[209] Cf. Arderne, *De Arte Phisicali et de Cirurgia*, trans. D'Arcy Power, p. 2, Wellcome Historical Medical Museum, Research Studies in Medical History I and *Physicians of Myddvai*, p. 423.

[210] It is several times referred to as an aphrodisiac.

[211] *The Legende of Good Women*, l. 2669-70.

[212] The opium of Thebes was much used the 13th and 14th cent. and was prepared from the expressed juice of the poppyheads; the older property of opium, under ' meconium,' which was still used, consisted of an extract of the whole plant.

[213] *Canterbury Tales*, A. l. 1471-4.

[214] *Ibid.*, l. 4159-61. See also *Piers Plowman*, C. XXIII, l. 377-9; ' The Court of Love,' l. 998-9, *Chaucerian and Other Pieces*; *Cursor Mundi*, l. 26322, l. 17707-8, E. E. T. S.

Dwale is usually supposed to be *Atropa belladonna* or deadly nightshade [215] but a safer translation, 'an opiate or sleeping draft,' is given by Skeat.[216] Henslow's [217] recipe to make dwale contains several narcotic herbs:

For to maken a drynke that men calle dwale, to make a man slep-en whyles men kerue hym—Take the galle of a borw-swyne and for a woman of a gilte [218] and iii sponful of the Ius of humloke and iii sponful of the wylde nep [219] and iii sponful of letuz and iii sponful of pope [220] and iii sponful of henbane and iii sponful of eysylle; [221] and medle hem alle to-gedre and boille hem a litil and do hem in a glasen vessel wel stoppede and do ther-of iii sponful into a potell of good wyne or good ale and medle hem wel togedre, til it schal ben noted; and thanne lat hym that schal ben curuen sitte ageyne a good fyre, and make hym to drinke ther-of till he falle on slepe. And thanne men may safly keruen hym.

Our English surgeon, John Arderne made use of anaesthesia to prevent pain during operations; he gives recipes for a powder, pills and an ointment to cause sleep:

Puluis for to make a man sleep agaynz his wille . . . Recipe semen iusquiamus,[222] ʒiʒannie, i[e]darnel,[223] papaueris nigri, i[e]chessede,[224] de radice brionie sicc.,[225] ana; [226] brek al togidre in a brasen morter into ful smal poudre, of which poudre giffe hym in his potage. . . . Pillules for to prouoke slepe: Recipe amides ℥i, croci ℥iii, opii ℥i; Make tham wyth watre of roses. . . . Ane vntement slepyng, with which if any man be anoynted he schal mow suffre kuttyng in any place of the body without felyng or akyng. Recipe succus iusquiami, Mandrage, Cicute,[227] lattuce, papaueris albi & nigri, and the sedez of al thise forseid herbez, if thai may be hadde; anna; opii thebaici, opii Miconis ana, ℥i or ii; fresch swynez grese that sufficeth. Breke al thise wele & strongly togidre in a morter, and afterward boile tham strongly and than cole tham. And if it be noght thikke ynogh, putte to a litel propoleos, i[e] white wex, and kepe it to thine vse. And when thou wilt vse thereof, Anoynt his front, his pulsez, his templez, his arme-holez, his lonez [228] of his heud and his fete, and alsone he schal slepe so that he

[215] *Promptorium Parvulorum*, ed. Way, vol. 1, p. 134.
[216] Note to *Piers Plowman*, c. XXIII, l. 379.
[217] *Medical Works of the XIVth Century*, p. 90.
[218] a spayed cow.
[219] bryony.
[220] poppy.
[221] vinegar.
[222] henbane.
[223] cornfield weeds.
[224] chess seeds or poppy chasses.
[225] dry briony root.
[226] ?
[227] water hemlock.
[228] furrows? lit. 'lanes.'

schal fele no kuttyng. . . . Also the sede alon of iusquiami albi giffen in wyne to drynke make the drynker alsone for to slepe, that he schal noght fele what-so-euer is done to hym.[229]

To awaken the sleeper he recommends vinegar or mustard to be put to the nose and as a method of after treatment he recommends castor to be given 'in the mouthe or in drynk, or it be put in the nose; for castor chaufeth & most comforteth the synewez colded; and solueth the paralysye.'

The following method practised by John Arderne [230] is particularly interesting because the anaesthetic is administered by inhalation:

To provoke sleep. Let the patient be fumigated with the following: R. mallows, chenopodium, solatrum, poppy leaves, lettuce and the infusion of Alder. If this does not succeed, let his head, neck, arms, feet and hands be washed with several sleep compellers such as mandragora, storax or powdered opium placed on the patient's head.

Egrimony, if inhaled by the patient, produces anaesthesia:

> Lay it vnder a mannes hede
> And he schall slepe as he war dede.[231]

There are no references in literature to precious stones producing anaesthesia but according to the lapidaries such properties belonged to memphitis,[232] powdered and drunk in vinegar, and to jet.[233]

It is a curious fact that although anaesthesia dropped out of medical tradition its memory lived on in literature, especially in the drama. Shakespeare refers to it in *Othello* [234] and Middleton in his tragedy *Women, Beware Women* [235] says:

> I'll imitate the pities of old surgeons
> To this lost limb, who, ere they show their art,
> Cast one asleep, then cut the diseased part.

---

[229] *Fistula in Ano*, pp. 100-1.

[230] *De Arte Phisicali et de Cirurgia*, p. 2; cf. Gui de Chauliac, *La Grande Chirurgie*, ed. Nicaise, 1890, p. 436.

[231] 'A Middle English Rimed Medical Treatise,' l. 603-4, *Anglia*, 34.

[232] Isidore, *Etymologiae*, IV, 13.

[233] First translation into French of the Lapidary of Marbode, quoted from Evans, *Magical Jewels of the Middle Ages*, 1922, p. 55.

[234] Act III, Sc. iii.

[235] Act IV, Sc. i.

H.

THERAPEUTICS

Of all branches of the healing art fourteenth century therapeutics appears to us as the most primitive. In the therapeutic measure of these early days are found many strange articles such as powdered mummy and usnea, or moss grown in the skulls of criminals that had been hanged and exposed in chains. Some recipes, such as the following, seem to be devoid of reason:

For the flyx—Take the rust of the belle-claper and temper it with water and drynke it.[286]

The following cure for sore eyes seems to be a joke at the expense of the physicians and the popular remedies of the day:

For a man that is almost blynd,
Let hym go barhed all day ageyn the wynd,
Tyll the soȝne be sette;

And than wrap hym in a cloke,
And put hym in a hows full of smoke,
And loke that every hol be well shelt
And whan hys eyen begyne to rope [287]
Fyll hem full of brymston and sope,
And hyll [288] hym well and warme.
And yf he se not by the next mone,
As well at mydnyght as at none,
I schal lese my ryght arme.[289]

(1) *Aphrodisiacs*

Aphrodisiacs were popular in the time of Galen, who describes love philtres made of saffron, spanish camomile, euphorbia, white pepper, henbane, spiken and opium, and remained in vogue until the end of the eighteenth century.

Aphrodisiacs were undoubtedly much used in the fourteenth century; there are general references to them in the literature of the period:

[286] Henslow, *Medical Works of XIVth Century*, p. 116.
[287] grow sticky. [288] cover.
[289] 'A good medycyn for sor eyen,' *Songs and Carols*, No. 17, Percy Soc. 23.

'He drynketh ypocras,[240] claree [241] and vernage,[242]
Of spices hoote, tencressen his corage;
And many a letuarie hath he ful fyn
Swiche as the cursed monk Daun Constantyn
Hath writen in his book, "De Coitu." '[243]

'And in the auld the curage douf [244] and deed,
Of quhilk the fyr outward is best remeid,
To help be phisik quhair that nature failit.'[245]

In the early fifteenth century Hoccleve [246] lamented the popularity of such 'provocatyues' and their evil results. It is clear from John of Gaddesden's 'learned Comments and Receipts concerning the detestable practice of Provocatives' [247] that aphrodisiacs were part of orthodox medical practice during this period.

The aphrodisiacal remedies were divided into two principal groups, (a) those containing spices and similar ingredients and (b) those of animal origin described as opotherapeutical.

The mandragora or mandrake root was a popular aphrodisiac from early times.[248] In the following lines from 'A Bestiary' [249] it is even recommended for an elephant:

Oc he arn so kolde of kinde
That no golsithe [250] if hem minde,
Til he noten [251] of a gres,
The nam is mandragores.

An unusual aphrodisiac is mentioned in *Piers Plowman* [252] namely the walnut:

[240] A beverage composed of wine, with spices and sugar.
[241] A wine with honey and spices.
[242] A sweet wine, sometimes red but more often white.
[243] Chaucer, *Canterbury Tales*, E. l. 1807-11.
[244] benumbed.
[245] 'Testament of Cresseid,' l. 32-34, *Chaucerian and Other Pieces*, ed. Skeat.
[246] 'Regiment of Princes,' l. 1604-10, E. E. T. S. 72.
[247] Freind, *History of Physick*, vol. 2, p. 289.
[248] Genesis, chap. 30, V, 14.
[249] l. 610-13, *An Old English Miscellany*, E. E. T. S. 49.
[250] lasciviousness.
[251] to make use of.
[252] B. Text, XI, l. 250-4.

Al though it be soure to suffre there cometh swete after;
As on a walnot with-oute is a bitter barke,
And after that bitter barke (be the shelle aweye),
Is a kirnelle of conforte kynde to restore;
So is, after, pouerte or penaunce paciently ytake.

It was a common custom, according to the works of Catullus,[253] Virgil [254] and others to scatter nuts on the nuptial threshold; also in the work of Sheik Nefzaoui entitled *The Perfumed Garden* there is a reference to Djelinouss [255] who recommends the almond as an ingredient in an aphrodisiacal mixture. Niclot [256] is of the opinion that such apparent references to nuts as aphrodisiacs are the result of a confusion of terms in translation: 'Nous apprenons ainsi que le groupe des noix se confond en certain points avec celui des glands: notre noix, la noix "royale" est le "gland de Jupiter," "juglans" en latin.' Probably the idea of the aphrodisiacal value of the walnut in the fourteenth century developed from the acknowledged nutritive value of nuts as a whole.[257]

The most popular aphrodisiac in the fourteenth century was garlic. Chaucer's Somnour who was 'lecherous as a sparue' was particularly fond of it:

Wel loved he garleek, oynons [258] and eek lekes.[259]

Leeks as aphrodisiacs are also found in 'A Middle English Rimed Medical Treatise': [260]

Etyngge of lekes gerres maydounes wilde
Thorw mannes help consaiue childe.

---

[253] LXI, 'Concubine, nuces da.'

[254] Ecloga VIII, 'sparge marite nuces.'

[255] An Arabic word, meaning extreme pleasantness, which is applied to Galen. *The Perfumed Garden* of the Sheik Nefzaoui trans. into French by M. le baron R··· in 1850 from an Arabic MS. of XVIth cent., chap. XIII.

[256] 'A propos d'un texte de Rabelais: l'oignon et la noix aphrodisiaques,' *Paris méd.*, 1931 (Annexe), 1 pp. iii-vi.

[257] Cf. Andrew Boorde, *Introduction to Knowledge*, p. 283.

[258] Cf. 'l'oignon' as an aphrodisiac in *The Perfumed Garden*, chap. XIII.

[259] *Canterbury Tales*, Prol. l. 634.

[260] l. 7-8.

Garlic was supposed to be heatgiving:

> Make vs somme garlyk;
> We shall haue all the day
> More hete in our membres.[201]

According to Niclot [202] it was again due to a confusion arising from a mistranslation of the Latin 'bulbos' meaning bulbs or roots that the common onion came to have aphrodisiacal qualities.

There is only one reference in the literature of the period to the opotherapeutical kind of aphrodisiac:

> To restore Nature:—Take iii chekyns or iiii as ye lyke & put them in a coope to feede, as I shalle teche you. Fyrste take a quantyte of whete, & put yt in clene watyr, & then gadyr a good quantyte of snayles that beer howses on them & put them thereto as they be, shelles & alle; and yf he canne fynde no soche snayles, thanne take blak snayles, and so thanne boyle alle these to-gyder, the whete & the snayles in water, with the shelles of them that haue shelles, & for lakke of them that haue shelles, boyle the blakke snayles. And whan it is welle boylid to-gedyr then take oute the whete by hymselfe, & the watyr by hym-selfe, & cast away the shelles & the corruptyon of the snayles, And with that whete fede the checons, and with brede a-monge, And let them drynke of the watyr, & of none other watyr. And when ye be dysposyd, ete a chekyn, one day rostyd, And ii days after another, & so contynue as ye fynde yt doth you good. Probatum est.[203]

Aphrodisiacs have always been more or less identical with the substances supposed to promote conception; there is a receipe for such an 'electuary' in Henslow's *Medical Works of the XIVth Century* [204] but the actual ingredients are not named. 'A Middle English Rimed Medical Treatise' [205] says that *Leonurus cardiaca* 'will helpe to consayuynge.'

The contrary practices of causing sterility and abortion were not unknown. Chaucer in 'The Parson's Tale' [206] refers to such practices as homicide; the same attitude is found in the *Ancren Riwle*: [207]

> 'theo thet dronc eni drunch, other ei thing duthe hwarthuruh no childe

[201] Caxton, *Dialogues in French and English*, p. 27, E. E. T. S., E. S. 79.
[202] *Op. cit.*
[203] *Political, Religious and Love Poems*, p. 36, E. E. T. S. 15.
[204] p. 104.
[205] l. 261.
[206] *Canterbury Tales*, I. 575 ff.
[207] p. 210.

ne schulde beon of hir istreoned[268] other thet istreoned schulde vorwurthen,[269] nis this strong monsleiht, of golnesse[270] awakened?'

In 'A Middle English Rimed Medical Treatise,[271] fumitory and sedum are used for this purpose:

'She that drynkes fumiter and the stoncrope
Schal neuere yong childe in cradell roke.'

(2) *Gold and precious stones*

Chaucer's 'The Canon's Yeoman's Tale' and the fourth book of Gower's *Confessio Amantis* are devoted to the description of alchemy, a pseudo-science which undoubtedly had an effect upon the healing art of the time.

Gower tells us that the object of alchemy was the production of the Elixir or Philosopher's Stone:

These olde Philosophres wyse
Be weie of kinde in sondri wise
Thre Stones maden thurgh clergie.
The ferste, if I schal specifie,
Was 'lapis vegetabilis,'
Of which the propre vertu is
To mannes hele for to serve,
As forto kepe and to preserve
The bodi fro siknesses alle,
Til deth of kinde upon him falle.
The ston seconde I thee behote
Is 'lapis animalis' hote,
The whos vertu is propre and cowth
For Ere and yhe and nase and mouth,
Whereof a man mai hiere and se
And smelle and taste in his degre,
And forto fiele and forto go
It helpeth man of bothe tuo:
The wittes fyve he underfongeth
To kepe, as it to him belongeth.

---

[268] conceived.
[269] perish.
[270] lust.
[271] l. 742-45.

The thridde Ston is special
Be name is cleped Minerall,
Which the metalls of every Mine
Attempreth, til that thei ben fyne,
And pureth hem be such a weie,
That al the vice goth aweie
Of rust, of stink and of hardnesse:
And whan thei ben of such clennesse,
This Mineral, so as I finde
Transformeth al the ferste kynde
And makth hem able to conceive
Thurgh his vertu, and to receive
Bothe in substance and in figure
Of gold and selver the nature.[272]

The idea of the Elixir being able to prolong human life was very common and of early origin; [273] it was probably based on the analogy that as the Elixir is capable of purging away all the impurities of metals so that they become gold, so it can purge away the impurities of the body which cause premature death. The more conservative writers [274] believed that the gold of alchemy had not the medicinal powers of natural gold; pure gold was described by John of Gaddesden [275] as a temperate cordial verging towards heat and was used by him in the form of gold filings for making a Golden Powder for syncope of the heart. John Arderne [276] used slime of gold for heart attacks and syncope.

Chaucer proves the popularity of gold as a medicine when he says of the ' Doctour '

For gold in phisik is a cordial
Therefore he lovede gold in special.[277]

According to Bartholomaeus Anglicus [278] gold has the virtue to cleanse the body of all superfluities, prevents the breeding of leprosy

[272] *Confessio Amantis*, IV, l. 2522-64.
[273] Cf. Roger Bacon, *Opus Majus*, trans. R. B. Burke, 1928, vol. 2, pp. 622-4.
[274] e. g. the author of the *Libellus de Alchimia*, said to be Albertus Magnus.
[275] *Op. cit.*, pp. 141-5.
[276] *De arte Phisicali et de Cirurgia*, trans. D'Arcy Power, p. 16, Wellcome Historical Medical Museum, Research Studies in Medical History, No. 1.
[277] *Canterbury Tales, Prol.*
[278] *Mediaeval Lore*, ed. T. Steele, p. 34.

and even hides it; this strange idea of gold concealing leprosy rather than actually curing it is also found in a receipe for 'A precious watir and a riche' quoted in Muller, *Aus mittelenglischen Medizin-Texten*.

The belief in the medicinal virtue of gold persisted long after the fourteenth century;[279] in fact it was only with Paracelsus[280] and others of his age that gold entered fully into its kingdom.

Not only metals but precious stones also were used in medicine. John of Gaddesden used pearls and corals in his prescription for a 'Golden Powder'; he also used them in an electuary for hectic fevers.[281] He used ivory turnings[282] for the sight and to refresh the memory; ivory was also supposed to cure jaundice.[283]

John Arderne[284] believed in the therapeutic value of precious stones; he mentions the following as restraining blood:

> Iaspar of grene colour hauyng in itself naturale droppes of blode, Saphir rede coralle rubye.

He also quotes 'lapis omoptoes'[285] for which the Latin text gives haematites or bloodstones, as a restrictive medicine for fluxes. He also used powdered pearls[286] for the heart, epilepsy and future leprosy. The sapphire, if dissolved in the juice of lemons was an antidote against the stinging of scorpions.

The belief in the medicinal value of precious stones died a hard death; in the sixteenth century sapphires, emeralds etc. were used in all tonics to protect the heart against the effect of poison and the plague; Gascoign's Powder, almost the last we hear of the medicinal value of precious stones, had an immense vogue in England as late as the eighteenth century.

(3) *Animal Substances*

Many parts and organs of the human body and of animals were employed as remedial agents. The fundamental principle underlying

[279] Cf. Ben Jonson's *Volpone*; Francis Anthony, *The Apologie; or Defence of a Verity Heretofore Published Concerning a Medicine Called Aurum Potabile*, 1616.
[280] 1490-1541.
[281] *Op. cit.*, p. 97.
[282] *Ibid.*, pp. 141, 143.
[283] Muller, *op. cit.*, p. 182.
[284] *Fistula in Ano*, p. 66.
[285] *Ibid.*, p. 63.
[286] *De Arte Phisicali et de Cirurgia*, p. 6.

the belief in the curative values of these substances was not altogether unreasonable in its origin, namely that these parts and organs contained a volatile salt which, when separated by distillation, possessed medicinal properties capable of healing the disease corresponding to each part or organ; i. e. preparations of the skull were given for epilepsy; the fat of man was used in rheumatism; urine was taken internally for stone, gout, hysterical vapours, jaundice and dropsy.[287]

According to the same principle foxes' lungs were administered in pulmonary complaints; nevertheless the author of *Piers Plowman* [288] is not following this principle when he refers to the lungs of beasts as a cure for lameness:

> And lame men he lechede with longen of bestes.

nor does this treatment appear to have a parallel in either orthodox or popular medicine.

The gall of man, animals, birds and fishes had long been employed in the treatment of eye ailments. Chaucer [289] mentions hyaena's gall as a cure for blindness:

> The nedeth nat the galle of noon hyene
> That cureth ÿen derke fro hir penaunce.

Henslow [290] recommends the gall of a goat for the same purpose.

The gall of other animals was used to cure various diseases;[291] the following example is interesting because it suggests the modern treatment of pernicious anaemia by means of liver or stomach:

> Pro eadem [flux].—Take a yonge chyke and dyght him and take out the gottus and put hym (i. e. the gottus) and meng hym with wex; roste hym and yef the sike to ete.[292]

The use of human blood in effecting cures had been used from times of antiquity; the Romans believed the blood of gladiators to be a cure for epilepsy. Human blood was used for this purpose in

[287] This is the principle of modern diuretics.
[288] C. Text, IX, l. 189.
[289] 'Fortune,' l. 35-6.
[290] *Op. cit.*, p. 94. The gall of a hare is used as an alternative, p. 112.
[291] e. g. the gall of a black bull for head-ache, Muller, *op. cit.*, p. 120.
[292] Henslow, *op. cit.*, p. 178.

the Middle Ages and also when dried and powdered as a styptic to prevent haemorrhage.[293]

In the *Confessio Amantis*[294] the 'grete clerkes' suggest curing Constantine of the leprosy by the following means:

> Thei wolde him bathe in childes blod
> Withinne sevene wynters age.

This passage does not seem to have a parallel in English medical practice of the time although it is stated that human blood was used for diseases of the skin in general.[295] It is of interest that blood taken from the patient and injected under the skin is sometimes recommended today in the treatment of acute dermatitis and eczema.[296]

Human milk was given in cases of pulmonary disease:

> Juse of lekes with wommanys mylke
> Drynke for host[297] is none swilke.[298]

and was also used to bathe inflamed eyes.

The fat, lard or grease from various animals was used for joints and sinews; Lydgate[299] describes an ointment made from a sheep's head boiled complete with wool:

> Of whose hede boyled, hole wole and alle,
> There coomythe A Iely, An oynment fulle Ryalle;
> For ache of bonys and also for brusure,
> hit Remedyethe and dothe ease blyve,
> Causithe men sterke pynttis[300] to Recure,
> Dede senewys Agayne Restorythe to lyffe.

It must not be supposed that these substances were peculiar to the therapeutics of the fourteenth century; they had been used by Galen and all of them with many more even more nauseating were made official in the *London Pharmacopoeia* of 1618, 1650 and 1677.

[293] Arderne, *Fistula in Ano*, pp. 89-90.
[294] Bk. II, l. 3206-7.
[295] Thompson, C. J. S., *Mystery and Art of the Apothecary*, p. 211.
[296] Mackenna, R. W., *Diseases of the Skin*, 1933.
[297] cough.
[298] 'A Middle English Rimed Medical Treatise,' l. 15-20, *Anglia*, 34.
[299] 'The Horn, the Shepe and the Gosse,' l. 69-74, E. E. T. S. 15.
[300] joints.

(4) *Fruits and herbs*

There are literary references to two fruits used in fourteenth century therapeutics, namely the lemon and the pomegranate.

Mandeville [901] asserts that the juice of the lemon is a defence against the bites of serpents and of crocodiles:

> This pouer folk when thai ga in to this lowgh for to gader the precious stanes, thai enoynt them all ouer with the ius of the fruyt that es called lymons, and than thai drede noght the cocodrilles ne the other [venymous vennym].'

It is interesting to note that the natives of Ceylon still use lemon-juice for the bites of land-leeches, not only to stop the flow of blood but to expedite the healing of the wound.[902]

The pomegranate was regarded as a luxury in Biblical times [903] and was still prized as such in the fifteenth century:

> Orengis a[nd] apples of grete apryce,
> Pungarnetis and many other spycis.[904]

Chaucer [905] refers to the general medicinal value of this fruit:

> That is a fruyt full well to lyke,
> Namely to folk whanne they ben sike

and in a poem entitled 'A Commendation of Our Lady' [906] the Virgin is supplicated as follows:

> O punical pome ayens al pestilence.

The fruit would be refreshing in sickness on account of its juicy quality; Rhazes [907] gave the juice of the pomegranate and all other acid and astringent plants as medicines for the smallpox. John Arderne [908] prescribes the juice of the pomegranate to cure drunken-

[901] *The Buke of John Maundeuill*, chap. 21, p. 98; also chap. 18, p. 84.
[902] Tennent, Sir J. E., *Natural History of Ceylon*, 1861, p. 481.
[903] 'Numbers,' XIV, 23; 'Deuteronomy,' VIII, 8.
[904] *Play of the Sacrament*, l. 105-6.
[905] *The Romaunt of the Rose*, l. 1355-8.
[906] *Chaucerian and Other Pieces*
[907] *A Treatise on the Small-pox and Measles*, chap. XII, Syd. Soc., 1848.
[908] *De Arte Phisicali et de Cirurgia*, trans. D'Arcy Power, pp. 2, 19, 25, 27.

ness and vomiting and pomegranate seeds, together with other ingredients, in a syrup to cure a flux of blood.

One of the most popular among medicinal herbs was the rosemary; the name probably assisted in promoting the fame of the plant as it was believed to be associated with the Virgin; actually its name was derived from 'ros maris,' probably because it grew near the shores of the Mediterranean. According to the 'Fragment of a Poem on the Virtues of Herbs' [809] it was a remedy for all cold maladies such as cold in the head, worms in the teeth and the falling sickness.

Gower [810] mentions two plants, gentian and myrrh, which were evidently well-known for their medicinal qualities:

> Loke, how a sek man for his hele
> Takth baldemoine [811] with canele [812]
> And with the Mirre takth the Sucre.

According to 'Extracts in Prose and Verse from an Old English Medical Manuscript' [813] gentian was good for the stomach and the spleen and for 'palcis aboute ye brest,' which may mean palsy.

As well as being taken as an internal medicine, myrrh was used, with many other ingredients, in a plaster for wounds.[814]

A list of herbs and spices used in making electuaries has already been quoted and the universal use of sage has been remarked upon. Ivy was also a favourite medicine

> Ageynst all bale she is blysse.[815]

This plant is one of the laxatives and liver stimulants which Dame Pertelote [816] recommends:

> A day or two ye shul have digestyves
> of wormes, er ye take your laxatyves
> Of lawriol, centaure, and fumetere,

---

[809] *Reliquiae Antiquae*, vol. 1, pp. 195-6.
[810] *Confessio Amantis*, 1, l. 1703-5.
[811] gentian.
[812] cinnamon.
[813] l. 1255-8.
[814] Henslow, *op. cit.*, p. 50.
[815] *Songs and Carols*, 70, Percy Soc. 23.
[816] *Canterbury Tales*, B. l. 4151-6.

Or elles of ellebor that groweth there,
Of katapuce[217] or of gaitrys beryis,[218]
Of herbe yve, growyng in oure yeerd, ther mery is.

Two unusual purgatives, 'jorepygra Galyen' and 'auteose,' are mentioned in the 'Fragment of a Poem on the Virtue of Herbs.'

It is interesting to find that Mandeville[219] mentions a beverage that is made of Calamel 'that men maken sugre of, that is of right gode savour and it is gode for the breest.' In the fourteenth century sugar was distinctly a luxury for the rich; honey, which is still a household remedy for hoarseness, was the substance used in all the popular electuaries; some authorities attributed the fall in popularity of these electuaries to the substitution of sugar for honey.[220].

Wild tansy was a popular remedy for corns:

For to dystroy a wrang nayle, otherwyse callyd a corne. Take wylde tansey, and grynde yt, and make yt nesche,[221] & ley it thereto, and it wyl bryng yt owght.[222]

Baths prepared from herbs, such as rosemary, to promote general health were popular.[223] The following fifteenth century recipe claims the power of healing disease:

Holy hokke & yardehok, peritory and the brown fenelle,
Walle wort, herbe John, Sentory, rybbewort & camamelle
heyhove,[224] heyriff,[225] herbe benet, bresewort[226] & smallache
broke lempk,[227] Scabiose, Bilgres,[228] wildflax is good for ache,
Wethy leves,[229] grene otes, boyled in fere fulle soft,
Cast them hote into a vesselle & sett youre soverayn alloft,

---

[217] ?purge.
[218] berries of the dog-wood tree.
[219] *Op. cit.* (C), chap. XV, p. 71.
[220] Wootton, A. C., *The Chronicles of Pharmacy*, vol. 2, pp. 30-31.
[221] soft.
[222] *Political, Religious and Love Poems*, p. 36.
[223] e. g. Sir Eglemour, l. 526-39, *Thornton Romances*; Fragment of a Poem on the Virtues of Herbs.
[224] ground ivy.
[225] cleavers.
[226] bruisewort.
[227] brook lime.
[228] The *New English Dictionary* suggests 'bilders.'
[229] willow leaves.

Se that place be couered welle ouer, & close on every side;
And what dissese ye be vexed with, grevaunce outher peyn,
This medicyne shalle make yow hool surely, as men seyn.[830]

I.

Remedies Akin to Those of Modern Times

Some fourteenth century remedies have quite a modern flavour. The following remedies are evidently lifted directly from the medical books of the time [831] and yet are of the kind which would be used today:

Ther nas quik-silver,[832] litarge,[833] ne brimstoon,
Boras, ceruce,[834], ne oille of tartre noon,
Ne oynement that wolde clense and byte [835]
That him mighte helpen of his whelkes [836] whyte
Nor of the knobbes sittynge on his chekes.[837]

Curry [838] says that the poet shews wisdom in ignoring the empirical remedy, composed chiefly of an adder, which was usually employed. The popular treatises,[839] however, favour the same remedies as Chaucer. John Arderne [840] used quicksilver, arsenic, lead oxide and sulphur for skin diseases.

Blindness seems to have been prevalent at this time; in the ideal 'Land of Cokaygne'

ther nis man no womman blinde.[841]

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[830] 'John Russell's Boke of Nurture,' l. 991-1000, *Babees Book*, E. E. T. S. 32.

[831] Cf. Lanfrank, *Science of Cirurgie*, p. 190, E. E. T. S. 102.

[832] Quicksilver or mercury salts in solution are antiseptic and in strong concentration, caustic.

[833] Lead oxide was the basis of most of the popular plasters and is mentioned by Galen as a remedy for leprosy; lead is still used in lotions and ointments for its astringment and soothing qualities.

[834] white lead carbonate or hydrate.

[835] The poet is clearly referring to arsenic which is still used internally in the treatment of skin diseases.

[836] pimples.

[837] *Canterbury Tales*, Prol. l. 629.

[838] *Chaucer and the Mediaeval Sciences*, 1926.

[839] Henslow, *op. cit.*, p. 40.

[840] *De Arte Phisicale et de Cirurgia*, trans. D'Arcy Power, pp. 45-47.

[841] *Early English Poems and Lives of Saints*, Trans. Phil. Soc., 1858.

The author of the *Ancren Riwle* [842] appreciated the fact that 'grene ouer alle heowes froureth [843] mest eien. Lydgate [844] is familiar with spectacles for the eyes; apparently people did not take very kindly to them and wore them rather shamefacedly:

> 'Loke sone after a potent [845] and spectacle
> Be not ashamed to take hem to thyn ease.'

An infallible remedy for sea-sickness has still to be discovered. There are, of course, many popular remedies varying from lemon-juice with dry toast to beer or stout; very similar remedies were tried in early times:

> Thys mene whyle the pylgryms ly,
> And have theyr bowlys fast theym by,
> And cry aftyr hote malvesy
> 'Thow helpe for to restore.'
>
> And som wold have a saltyd tost,
> Ffor they myght ete neyther sode [846] ne rost.[847]

According to John Mirfield,[848] fresh warm bread was good against foeter of the sea and if this were not available he says 'da tostum.' Possibly wine, like the modern lemon-juice remedy, was thought to prevent vomiting by reason of its acid reaction; salt, in sufficient quantity, would cause vomiting and thus might verge on a homoeopathic cure.

In short it is doubtful to what extent we can justly sneer at any of the old remedies while we continue to make indiscriminate use of all kinds of empirical remedies, proprietary medicines and gland preparations.

[842] p. 150, Camden Soc. 57.
[843] comforts.
[844] *Minor Poems*, 2, Percy Soc. 11. Spectacles were probably invented in the second half of the 13th cent. by Salvinodo Armato of Florence; Bernard de Gordon mentions 'oculus berillinus.'
[845] crutch.
[846] boiled (meat).
[847] 'A Pilgrimage to Compostella,' *Reliquiae Antiquae*, vol. 1, p. 3.
[848] *Breviarium Bartholomei.*

TEXTS AND DOCUMENTS

NOTES ON MORITZ SCHIFF (1823-1896)

HARRY FRIEDENWALD, M. D.

Moritz Schiff was one of the most eminent biologists of the second half of the last century. In the fields of ornithology, comparative anatomy and especially physiology, his contributions were numerous, and in the words of Garrison were "characterized by great originality of minutiae of experimental procedure, displaying almost prophetic insight into many things of present moment." It is surprising that there is so little on record concerning his personality. The scattered sketches that one finds are almost wholly made up of bibliographical lists with remarks, and discussions of his published writings.

I cannot do better than give the following brief account taken from Stirling's Apostles of Physiology:[1]

Moritz Schiff (1823-1896) is introduced as a "marked personality about this period. . . . He was born at Frankfort-on-the-Main, attended the Senkenberger Institute there, took his M. D. at Goettingen (1844), and obtained in Paris, under Magendie and Longet, and at the Museum, a wide knowledge of comparative anatomy. He was successively professor of microscopic anatomy and pathology in Berne (1855-62), of physiology in Florence (1863-76), and from 1876, professor of physiology in Geneva. He was a ceaseless and untiring worker in nearly every field of physiology. . . . The chronological list of his works exceeds two hundred."[2]

Documents in the University of Goettingen show that Schiff applied by letter, dated October 6, 1855, to be admitted as Privat-Dozent for experimental physiology. The faculty encouraged him to make a formal application. This latter document gives a detailed history of Schiff's scientific work up to that time. Other entries indicate that the faculty approved the granting of the application in

[1] Some Apostles of Physiology, William Stirling, London, 1902, p. 115.

[2] Gesammelte Beitraege zur Physiologie, Lausanne, 1894-98, 4 vol., collected and published by A. Herzen.

rather complimentary terms. A later note, however, adds that the Government refused to confirm the appointment, without giving reasons. It is stated in some of the biographical dictionaries that the Hanoverian government refused to give its consent because of his teachings, allegedly dangerous to students.[8]

The writer has obtained a photostatic copy, (which he presents to the Welch Library), of the formal application just mentioned. It consists of four large sheets, closely written in German script, of which the following is a copy:

> Die medizinische Fakultät der Georg- Augustsuniversität ersuche ich, mir zu gestatten, die nöthigen Schritte zu thun, um als Privatdozent der Experimentalphysiologie in Goettingen aufgenommen werden zu können.
>
> Nachdem ich im Januar 1844 in Folge einer öffentlichen Disputation und Promotion in Goettingen die Doktorwürde erlangt hatte, begab ich mich nach Paris, wo ich mich zum Theile mit praktisch- medizinischen Studien und dem Besuch der Hospitäler, grösstentheils aber mit physiologischen Uebungen beschäftigte. Ich besuchte nicht nur Magendies Vorträge im College de France, sondern wohnte auch den Vorbereitungen zu diesen Vorträgen bei, zu welchen mir durch Magendies besondere Gefälligkeit der Zutritt gestattet wurde. Hierdurch, und durch die Zuvorkommenheit, mit welcher Herr Magendie mir sein Laboratorium zur Verfügung stellte, und in meiner Gegenwart mehrere der schwierigeren Experimente wiederholte, die ich besonders zu sehen wünschte, wurde ich zuerst spezieller in die experimentelle Technik eingeführt. Später wohnte ich Longets Vorträgen bei, und es war mir während der letzten 8 Monate meines Aufenthaltes in Paris gestattet den damaligen Studien Longets über die Physiologie des Nervensystems als Assistent beizuwohnen. Eine Reihe von Differenzen zwischen den Ergebnissen Magendies und Longets in Beziehung auf die Physiologie einzelner Hirntheile veranlasste mich damals, auch selbstständige Studien über die Physiologie des Gehirnes anzustellen, und ich war so glücklich sowohl hier, als auch bei

[8] Hirsch, Biograph. Lexikon., Allgemeine Deutsche Biographie, Vol. 54. p. 9.

der Wiederholung einiger anderer neurolog. Experimente, einige neue Thatsachen aufzufinden, während ich andererseits nicht versäumte, die im Pflanzengarten aufgestellten Sammlungen zur Vermehrung meiner zoologischen Kenntnisse zu benutzen.

In Sommer 1845 kehrte ich nach Frankfurt zurück, wo ich mich seitdem mit unbedeutenden Unterbrechungen (unter denen ich also besonders instruktiv einen kurzen Aufenthalt in Leyden hervorhebe) beständig aufgehalten habe. Ich legte daselbst mein Staatsexamen ab, um das Recht zur Praxis zu erhalten. Da unter den Bedingungen zur Erlangung des letzteren auch die Vorlegung einer Inauguraldissertation vorgeschrieben ist, was mir zur Zeit meiner Promotion nicht bekannt war, so benutzte ich die Ergebnisse meiner neurologischen Forschungen, um sie zu einer Schrift unter dem Titel *de vi motoria baseos encephali* auszuarbeiten, welche ich diesem Gesuche beilege in der Hoffnung, dass sie, wie dies vom Frankfurter Medizinalkollegium damals geschehen ist, auch von der medizin. Fakultät zu Goettingen als Aequivalent einer Dissertation betrachtet werde. Von dieser Schrift, welche im Buchhandel vergriffen ist, wird jetzt eine zweite weiter ausgearbeitete Auflage vorbereitet, in welcher leider, nach dem Willen des Buchhändlers, der originellste Theil derselben, nähmlich, das Lateinische, verloren gehen soll, welches ganz von meiner *Erfindung* ist, und bei dem mir, wie man beim ersten Blick sieht, kein Philologe hilfreich zur Seite gestanden. Weitere Versuche über das Gehirn, die mich nach Herausgabe dieser Schrift beschäftigten, wurden im folgenden Jahre unter dem Titel " Beiträge zur Kenntniss des Motorischen Einflusses der im Sehhügel vereinigten Gebilde " veröffentlicht (Tübinger Archiv 1846 Jg. 667).

Im Jahre 1846 wurde ich von der Senkenbergischen Gesellschaft zum Sektionsvorsteher der ornithologischen Sammlung ernannt und die Verpflichtungen welche mir hieraus erwuchsen, besonders die Bestimmung und Katalogisirung der vielen in der Sammlung aufgestellten noch nicht genügend bekannten Vögel, nahm in diesem wie in den folgenden Jahren einen grossen

Theil meiner Zeit in Anspruch. Bei der Fortsetzung der schon früher begonnenen Studien über den Einfluss der Nerven auf die Cirkulation fesselten mich besonders eine erst kürzlich veröffentlichte Versuchsreihe über den trigeminus der ungeschwänzten Batrachier, und der damals gerade von Traube in Abrede gestellte direkte Einfluss des Vagus auf die Gefässe der Lunge. Eine grosse Reihe von Versuchen über den letztgenannten Gegenstand resümirte ich in einem Aufsatze im Tübinger Archiv "Ueber die Lungenveraenderung nach Durchschneidung des 10 ten Nerven" in welchem ich die in dieser Beziehung von Herrn Henle zuerst aufgestellten Ansichten experimentell vertheidigte.

Im Jahre 1847 have ich von grösseren Reihen selbständiger Versuche fast nur die über den Herzschlag in seinen verschiedenen Beziehungen zur Nerventhätigkeit angestellt. Da diese Versuche eine sehr häufige Wiederholung und eine sehr sorgfältige Ausführung erforderten, nahmen sie fast meine ganze Zeit in Anspruch. Nur gegen Ende dieses Jahres konnte ich nebenbei eine Reihe von Experimenten über die Nerven der Zunge bei Säugethieren beginnen.

Im Jahre 1848 wurden die Herzversuche fortgesetzt und in zwei grösseren Abhandlungen beschrieben. Die eine "über die Nerven des Herzens" sucht darzuthun dass der Herzschlag, insoweit er überhaupt von den Nerven abhängig ist, ganz unter der Herrschaft des Cerebrospinalsystems und der Centraltheile steht, ohne einem besonderen sympathischen Nervensysteme unterworfen zu seyn. Die andere "der Modus der Herzbewegung" die erst im folgenden Jahre veröffentlicht wurde, zeigt, dass die Annahme besonderer Nervencentren im Innern der Herzsubstanz eine ganz unnöthige ist, und nichts zur Erklärung der Erscheinungen des Herzschlages beitragen kann.

Das Studium der Nerven des Blutherzens führte mich auf die Lymphherzen der Frösche, und es glückte mir, mehrere der über ihre Beziehung zum Nervensystem herrschenden Ansichten zu berichtigen. Die erste Versuchsreihe über die Zungennerven, welche in Uebereinstimmung mit den Versuchen von Biffi und Morganti dem Trigeminus die Leitung der Ge-

schmackseindrücke von den vorderen zwei Drittheilen der Zunge vindizirte, wurde beendet. Eine Entgegnung Traubes gegen meinen Aufsatz über den Vagus bewog mich, abermals eine grössere Versuchsreihe über die neuroparalytische Lungenhyperämie anzustellen, deren Ergebnisse meine früheren unterstützten und die im Tübinger Archiv abermals veröffentlicht wurden.

Die Versuche über die Lymphherzen wurden auch im Winter 1849 wiederholt und fortgesetzt und eine vorläufige Darstellung der erlangten Ergebnisse in Henle's Zeitschrift niedergelegt. Die Experimente über den Einfluss der Nerven auf die Gefässe des Auges griff ich nun, durch die Aetherisation unterstützt, von Neuem und in grösserem Massstabe wieder auf und eine Versuchsreihe über den Einfluss der Nerven auf die Ernährung der Knochen wurde begonnen. Eine Fortsetzung der Untersuchungen über die Zungennerven hatte die *Bewegungsnerven* zum Gegenstande. Auch auf diesem, wie es schien erschöpften Felde, blieb mir noch die Ausbeute vereinzelter aber sehr auffallender Thatsachen. Die Controverse über die Deviation der Zunge bei Hemiplegischen fand hierbei ihre Erörterung, und die rhythmischen oszillirenden Bewegungen der gelähmten Muskelbündel wurden entdeckt, und an den Muskeln der Barthaare der Säugethiere nach Lähmung des facialis bestätigt. Eine kleine Abhandlung im Tübinger Archiv "über die motorische Lähmung der Zunge" war die Frucht dieser Untersuchungen. Diese Arbeit führte mich im Jahre 1850 zu einer Prüfung der herrschenden Ansichten über die Thätigkeit der quergestreiften Muskeln im Allgemeinen, und ihre Unterschiede von der der organischen Muskeln, und ich hatte das Glück fast gleichzeitig mit Volkmann oder vielleicht noch etwas früher als Letzterer, Versuche zu veröffentlichen, die mit den seinigen darin übereinstimmten dass sie die Thätigkeit beider Arten von kontraktilen Geweben viel mehr einander näherten als man dies früher zu thun geneigt war. Wenn sich Volkmanns Versuche und die späteren von Helmholtz nur auf den Zeitverlauf der Muskelzuckung bezogen, so zeigte ich auch dass die quergestreiften Muskeln in ihrem Ver-

halten zu lokalen Reizen und in der Fortpflanzung ihrer Bewegung der einfachen sehr nahe verwandt sind. Versuche die über die verschiedenen Beziehungen der peristaltischen Darmbewegung gemacht wurden, belehrten mich über die Ursache der so auffallenden Vermehrung dieser Bewegung unmittelbar nach dem Tode der Thiere, und indem ich die hypothetische Annahme eines reizenden Einflusses der Luft bekämpfte, erkannte ich in der Stockung der Blutzirkulation die Ursache jener sonderbaren Kontraktionen, wie ich dies in einem kleinen Aufsatze "über die Vermehrung der Darmbewegungen nach dem Tode" in Frorieps Tagesberichten geschildert habe.

In einem andern Aufsatze im Tübinger Archiv habe ich die Existenz und die Auffassung der rekurrirenden Sensibilität der vordern Spinalwurzeln wie sie früher von Magendie gegeben wurde durch neue Versuche bekräftigt.

Das folgende Jahr 1851 war grösstentheils Versuchen über die Verdauung gewidmet, welche mir zur Grundlage einer Abhandlung über diesen Gegenstand dienten, welche bald in Gemeinschaft mit Longet im ersten Theile von dessen Traité de physiologie herausgegeben werden wird. Untersuchungen über die Zungennerven bezogen sich dieses Jahr mehr auf das eigenthümliche Verhalten der *Gefässnerven* der Zunge. Dieser dritte Theil meiner Zungennervenarbeit wurde in Wiesbaden 1852 der Naturforscherversammlung auszugsweise mitgetheilt und im Tübinger Archiv 1853 veröffentlicht.

Durch Wallers Untersuchungen auf die Gewebsveränderungen durchschnittener Nerven aufmerksam gemacht, suchte ich dessen Erfahrungen für das Studium des Ursprunges des Bauchsympathikus zu benutzen; und habe auch hierüber meine Erfahrungen in einem kleinen vorläufigen Aufsatze niedergelegt.

Untersuchungen über die Leitungsgesetze innerhalb der Rückenmarksstränge mit denen ich mich schon seit mehreren Jahren eifrig beschäftigt, führten mich dieses Jahr zum Abschluss einer kleinen Abhandlung über die mittleren und vorderen Stränge des verlängerten Markes, in welcher ich nach meinen Versuchen und übereinstimmend mit den Ansichten von

Bell, den mittleren Strängen die Beherrschung der Atembewegungen zuwies.

Das Jahr 1852 war grösstentheils Untersuchungen über die Regeneration der Nerven gewidmet, mit der ich mich früher zwar schon vielfach, aber doch nur mehr gelegentlich, beschäftigt hatte. Diese Studien veranlassten mich denn auch mich ernstlicher als es früher geschehen war mit der mikroskopischen Anatomie der Nerven bekannt zu machen, der ich mich schon früher mit Interesse zugewendet, als die schönen Arbeiten von Herrn Wagner hier ein neues Feld erschlossen hatten. Ein Aufsatz über die Regeneration der Nerven im Archiv von Vogel, Nasse, und Beneke und ein Nachtrag zu demselben über die Persistenz des Achsenzylinders in gelähmten Nerven war eine Frucht dieser und vorhergehender verwandter Studien, ebenso ein anderer, welcher der französischen Akademie vorgelegt wurde und in den Comptes rendus vom März 1854, abgedruckt ist. "Sur la regeneration des nerfs et sur les alterations qui surviennent dans les nerfs paralysés." Dieser letztere Aufsatz hatte besonders zum Zweck, einige irrige Ansichten zu bekämpfen, welche Waller in die Lehre von der Nervenregeneration eingeführt hatte, so wie meiner nunmehr auch von Koelliker und Lent bestätigten Entdeckung von der beständigen Anwesenheit von Kernen in *allen* Scheiden der Nervenprimitivfasern erwachsener Thiere eine grössere Publizität zu geben. Eine andere Arbeit welche in diese Zeit fällt, "über den Bau der Ganglien bei den Vögeln" im 2ten Band des Journales für Ornithologie, beruht zwar auf vielen und mühsamen Untersuchungen, entbehrt aber vielleicht der erforderlichen Reife, indem sich die Resultate zwar denen Koellikers über die Säugethiere genau anschliessen, auch mit denen Bidders über die Frösche in Einklang zu bringen sind aber allzusehr von dem abweichen was uns die von den Herren Wagner und Robin angeregten überall bestätigten Untersuchungen über die Verhältnisse bei den Fischen ergeben.

Schon früher hatte ich als Assistent Longets die sonderbaren Erscheinungen, welche Magendie der Entziehung der Cerebrospinalflüssigkeit zuschrieb, als eine Folge der Durchschnei-

dung der Nackenmuskeln erkannt, und Longet arbeitete damals die von mir gemachte Entdeckung weiter aus, und legte die Arbeit der Academie de Médecine vor. Untersuchungen über die Circulationsverhältnisse in der Hirn- und Rückenmarkshöhle bei verschiedenen Thieren führten mich im Jahre 1852 auf die wahre Verbindung, die zwischen der Durchschneidung der Nackenmuskeln und jener bekannten Störung in den Körperbewegungen besteht. Eine kurze Mittheilung an die Berner Naturforschende Gesellschaft enthält meine Ansicht über diesen Gegenstand, sowie über die Bewegungsstörungen nach Verwundungen des kleinen Gehirns.

Die Studien über den Einfluss der Ganglien auf die Ernährung der Nerven, durch Wallers Arbeiten angeregt, kamen im Jahre 1853 zu einem vorläufigen Abschluss. Obschon die erhaltenen Resultate auch keineswegs befriedigen konnten, so waren sie doch in Beziehung auf einige der angeregten Fragen so entschiedener Natur, dass ich sie einstweilen als neurologische Notizen in dem in Goettingen erscheinenden Archiv für gemeinschaftliche Arbeiten veröffentlichte. Andererseits beschäftigte mich damals der Einfluss der Nerven auf die Wärme und eine Kritik der Bernardschen Ansichten über den Sympathikus, welche zuerst in No. 26 der Gazette hebdomadaire de medecine erschienen ist. Einige meiner Ornithologischen Arbeiten wurden in der von Bonaparte herausgegebenen und in den Memoires des savants etrangers abgedruckten " relation sur les voyages de M. Delattre dans l'Amerique meridionale " im Auszuge abgedruckt. Auf entomologischem Felde beschäftigte mich damals die Ordnung und Bestimmung einer grossen Sammlung deutscher Zweiflügler, die ich nach und nach zusammengebracht hatte, und die, wie ich glaube, eine der reichhaltigsten für die die westliche Fauna des mittleren Deutschlands ist.

Im Jahre 1854 beschäftigte ich mich besonders mit dem Einfluss der Nervencentra auf die thierische Wärme und die Resultate dieser Studien habe ich in dem ersten Theile der neurologischen Untersuchungen niedergelegt, welchen ich der Fakultät als Habilitationsschrift zu überreichen die Ehre habe. Meine Untersuchungen über den Sympathikus führten mich auf

die genauere Beobachtung der Ohrgefässe der Kaninchen, in welchen ich jene eigenthümlichen rhythmischen Bewegungen entdeckte, die ich als accesorisches Arterienherz beschrieben habe. Meine Arbeiten über den Einfluss der Nerven auf die Ernährung der Knochen wurden der französischen Akademie vorgelegt. Der von ihr ernannten Komission übergab ich einen Theil meiner Präparate und zeigte ihr meine Verfahrungsweise und ihrem Berichte verdanke ich es, dass die mit der Vertheilung der Monthyonschen Preise beauftragte Komission mir für diese Arbeit eine Belohnung von 2000 francs zuerkannte. Auch meine Beobachtungen über die Rückenmarksstränge wurden der der Akademie vorgelegt und ich hatte das Glück, die Herren Serres und Flourens, die zur Prüfung derselben ernannt worden waren, von den auffallendsten meiner Resultate zu überzeugen, die ausserdem später in Amerika von Brown Sequard bestätigt wurden. Mein memoire über die Knochen so wie das über die sensible Leitung im Rückenmark wurden in den Berichten der Akademie abgedruckt, sowie schon im vorigen Jahre die Schriften der Berner Naturforschenden Gesellschaft eine resumirende Darstellung aller meiner Versuchsresultate über das Rückenmark enthielten, während die anatomischen Untersuchungen der Herren Wagner, Stilling, Remak und Schroeder v. d. Kolk durch Begründung einer anatomischen Erklärungsweise meine Ueberzeugungen immer mehr erhärteten. Die letzte Zeit meines Aufenthaltes in Paris und Frankfurt war besonders ornitholog. Studien gewidmet, um vor meiner Abreise den begonnenen Vogelkatalog seiner Vollendung entgegenzuführen, was mir aber nicht vollständig gelungen ist. Meine Beiträge zu Bonapartes conspectus systematis Ornithologiae sind eine Frucht dieser Arbeiten.

Ausserdem habe ich in allen vorhergehenden Jahrgängen vor den Mitgliedern der Senkenberg. Gesellschaft Vorträge über die wesentlichsten Fortschritte der Physiologie gehalten, und die Versuche anderer Forscher, so weit es mir möglich war, wiederholt. Vor dem physikalischen Verein hielt ich vor einigen Jahren Vorträge über die Verdauung und die neueren Entdeckungen im Gebiete der Nervenelektrizität. (Letztere

aus Mangel an Instrumenten ohne Versuche). Mehrere andere angefangene Arbeiten hoffe ich, wenn es mir gestattet werden wird, in Goettingen, unterstützt von der Mitwirkung und dem Rathe ausgezeichneter Männer, zu vollenden, und mich daselbst, durch Befriedigung des Dranges nach mündlicher Mittheilung zu grösserer Klarheit emporzuarbeiten.

M. SCHIFF.

In the same year, 1855, in which the position at the University of Goettingen was refused, Schiff obtained the professorship in Berne; and eight years later in Florence where he taught for 13 years; and then in Geneva where he continued his work until his death 20 years later.

It happened that I learned that an old friend of mine had, in his early days, been an assistant of Schiff in Geneva, in 1888-89, and at our last meeting in 1935 in Palestine, he related some memories of his master. At my request he put them into writing, and the following notes are among those which I now wish to present.

I must first give a bit of information concerning my friend, the late Dr. Hillel Yofe of Palestine. He was born in a small village, Alexandrowsk, in the Ukraine, in 1864. He studied medicine in Geneva and thus became a student and later an assistant of Professor Schiff, his "beloved teacher." At the end of prolonged studies in Geneva and Paris, (having practiced medicine in Russia for a short period), he migrated to Palestine, in 1891, and giving up his special researches, he devoted himself entirely to general practice; first in Jaffa (1895-1907), later in Zichron Jacob (1907-19), and then in Haifa until his death, in January, 1936. He was especially interested in the study of malarial fevers, and contributed frequently to the Revue de Médecine Tropicale et d'Hygiène. He became one of the leading figures in the Jewish settlement of Palestine. My own acquaintance with him dated form 1911. As mentioned above, I obtained the following notes from him, and these I shall publish in the original French:

Prof. Moritz Schiff:

Petit de taille il avait une tête d'une beauté extraordinaire très régulière et encadrée d'une barbe blanche. De longs cheveux

blancs d'argent, des yeux gris perçants en en même temps si bons. Vifs perçant ils paraissaient vous pénêtrer jusqu' au fond de votre âme comme s'ils y cherchaient quelque chose à découvrir ou une souffrance à soulager. Son sourire était fin et bienveillant un peu ironique parfois. Il aimait beaucoup à plaisanter, à dire de bons mots très reussis. Modeste jusqu'à l'extrême, négligeant de sa mise, il ne s'intéressait qu'à la Science et à ses déductions sociales, sans admettre les convenances banales et ce qu'on appelle les lois de la Société. Je me rappelle qu'une fois le 1er Janvier en entrant au laboratoire je luì souhaitais une bonne année. Il sauta en l'air en demandant ce qui était arrivé depuis hier et en quoi ce jour était différent des autres.

Il a beaucoup souffert des attaques dirigées contre lui par la Société antivivisectionniste, lui qui ne permettait aucune opération sur les chiens, lapins, singes etc. sans narcose. Il avait toujours les poches pleines des restes de ses repas, surtout des biscuits, morceaux de gâteaux, osselets de poulets etc. etc. qu'il distribuait à ses pensionnaires. De vieilles Misses anglaises, américaines et suisses l'accablaient toujours de leurs injures pendant qu'à côté un professeur faissait impunément des expériences avec cruauté et sans ether ni chloroforme.

C'était un esprit excessivement développé intellectuel et large; avec celà original au suprême degré. Quand les étudiants se sont adressés à moi qui était alors son assistant, en priant de leur indiquer quelques traités de physiologie, il a répondu: qu'il était très embarrassé car, dit il: 'ceux qui écrivent des traités ne s'occupent pas de la science et ceux qui s'occupent de la science n'ont pas le temps d'écrire des manuels.' Il a tout de même donné quelques indications. Professant une bienveillance envers les étudiants pour les connaissances desquels il gardait un mépris profond, il ne laissait rèfuser presque jamais un étudiant aux examens. Travailleur infatigable il faisait travailler aussi beaucoup les aides et assistants, et il disait toujours (bien avant Taylor) que le changement de la manière de travailler était le meilleur repos et je le vois au milieu d'une grande salle de travail où plusieurs tables étaient

disposées avec microscopes, ses notes, les notes de ses assistants et lui tantôt assis absorbé par ses observations microscopiques tantôt faisant quelques lignes de son écriture presque illisible, tantôt marchant lentement la pipe éteinte entre les dents, très soudain, décidé de faire telle ou telle autre opération sur des animaux. Et ses animaux, surtout les singes (opérés au cerveau en général), il les observait en murmurant ou en chantonnant en leur offrant quelques friandises. Marié à une grande et belle italienne aut cheveux argentés il ne consacrait cependant pas trop de temps à la vie de famille ne manquant à l'Institut Physiologique ni jours de fête ni dimanches. Et même les soirs des réceptions où le high life intellectuel de Genève venait il restait dans son cabinet de travail avec quelques livres, articles ou microscopes. Pris vers 10½ il faisait son apparition en robe de chambre, pipe aux dents (plutôt aux gencives puisque les dents manquaient) il distribuait des poignées. de main et s'arrêtait devant quelque savant et l'entrainait dans son cabinet pour lui montrer quelque chose d'intéressant.

Il a travaillé dans toute les branches de la physiologie mais surtout dans les questions de la digestion, du système nerveux central, nerfs sensitifs et moteurs, avec dégénérescence ascendante et descendante, avec leur rapport avec le courant electrique. Beaucoup de choses qu'il avait découvertes, qu'il avait pressenties ont été publiées sous d'autres noms et lui non sans quelque ressentiment mais philosophiquement acceptait sans murmurer et seulement s'en ouvrait à ses assistants ou savants de sa famille.

Ne reconnaissant ni religion ni nationalité, il avait . . . une sympathie pour de jeunes juifs qu'il protégeait beaucoup, et une indignation profonde pour les persécuteurs. Il affirmait d'ailleurs toujours hautement son origine. Il aimait l'Allemagne mais pas les Prussiens. NB, lui avec son ami Carl Vogt on été condamnés à mort par le Prussiens après la révolution de 1848 . . .

Le celebrè Dr. W. Haffkine [4] était alors assistant due Prof. Schiff . . .

Oui Moritz Schiff était un type idéal de savant modeste, sérieux, corps et âme voué à la Science un vrai prêtre de cette Déesse. C'est aussi le type de l'homme tel que Diogène cherchait lanterne à la main.

Mont Carmel Août 1935 [5]

Dr. HILLEL YOFE.

Reference to Schiff's small stature and his indefatigable industry, mentioned in Dr. Yofe's letter, quite agree with a paragraph in Kussmaul's autobiography.[6] Writing about his fellow students he tells us:

"Der fleissigste von allen war ein origineller Frankfurter, der es später zum berühmten Physiologen gebracht hat: Moritz Schiff. Schon das Aeussere des kleinen Mannes war auffallend. Er trug abweichend von den Kommilitonen den Hals ganz frei und über dem Rock einen breit herausgelegten Hemdkragen. Sein Wissensdurst war unstillbar." (p. 198)

Kussmaul here mentions his and Schiff's common studies under the anatomist, Professor Tiedemann in Heidelberg. It was under the leadership of Tiedemann's oldest son that Schiff and Vogt(?) enlisted in the revolutionary army, Schiff as an army surgeon. Tiedemann was captured, tried by court-marshall, and shot. (p. 199.) It appears that Schiff and Vogt fled. It is probably this to which Dr. Yofe refers for I can find no other account. It was probably Schiff's participation in the struggle of liberation that frustrated his efforts to an academic post in Goettingen and led him to foreign lands.

In conclusion, it is of interest to note that Schiff sprang from a

[4] Waldemar M. W. Haffkine, born in Russia in 1860, studied medicine in Odessa, and then became assistant of Professor Schiff; later he worked at the Pasteur Institute and became distinguished especially through his investigations of the plague in India. He died in 1930.

[5] I was about to write to Yofe for certain details, when I learned of his death in January, 1936.

[6] Kussmaul, Jugenderinnerungen, Stuttgart, 3d ed., 1899.

well-known Jewish family, for many generations settled in Frankfurt. His great-grandfather was likewise the great-grandfather of the well-known philanthropist, Jacob H. Schiff. His brother, Hugo Schiff (1834-1915), was professor of chemistry at the University of Florence for fifty years. Moritz Schiff first married his cousin, Claudia Trier; their son Roberto, (born in 1854 and still living) was professor at the University of Pisa for 45 years. From a second marriage to an Italian lady, another son was born, Mario (1868-1914), who became professor of romance languages in France, and Professore di Litteratura Francese at the Institut di Studi Superiore di Firenze.